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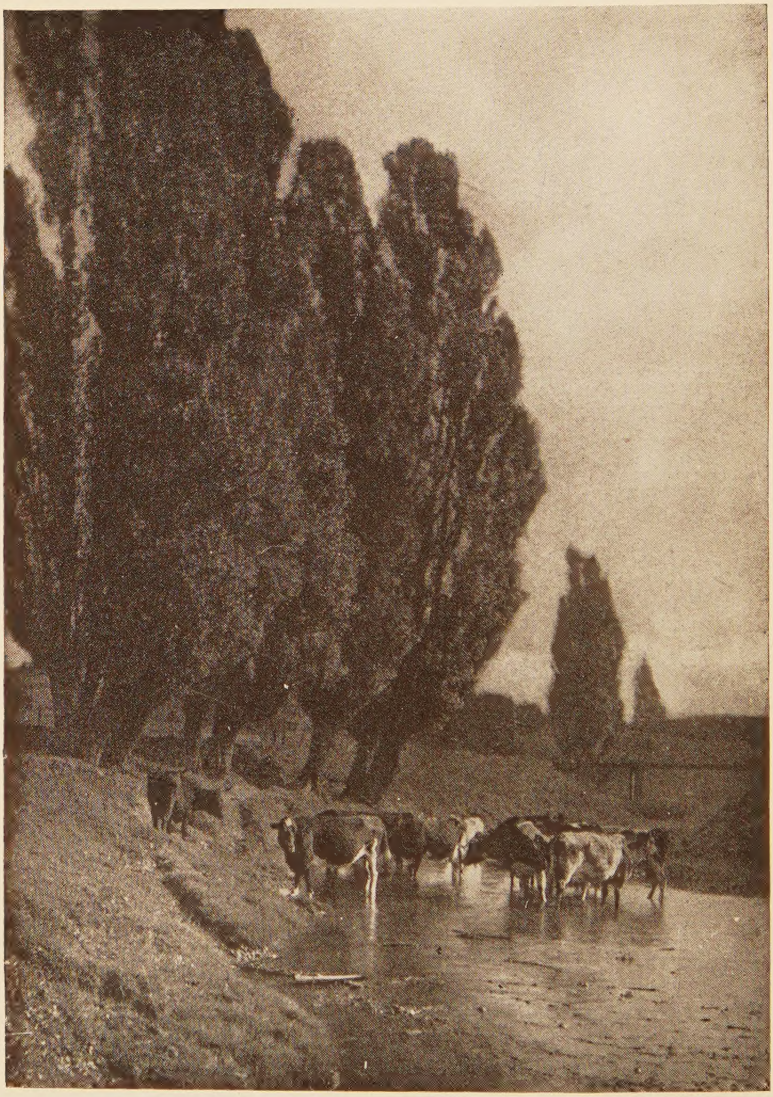

THE RETURNING HERD

STUDY No. 1 (Frontispiece) BY JOHN M. SCHRECK

Chem
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Complete Self-Instructing Library of Practical Photography

VOLUME IV

Photographic Printing

PART I

J. B. SCHRIEVER
Editor-in-Chief

Popular Edition

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CHAPTER I.

Introduction and Theory of Printing-Out Process.

1. After a glass, or film, negative has been produced it is necessary to have some means of transferring the negative image to a positive form and placing it upon some permanent substance. For commercial purposes chemically pure paper is most generally employed, it being coated with a substance sensitive to the action of light. When this sensitive paper is placed under a negative, the light readily penetrates the transparent portions of the negative and causes a darkening of the sensitive chemicals on the surface of the paper. The most dense portions of the negative keep the light from acting upon the paper, so that when the shadows of the original object have become very dark, the highlights will be almost white, not having been affected to any degree by the light. There will, however, be not only dark and light spots, but a delicate range of gradation between these two extremes in exactly the same degree, but in reverse order, as they exist in the negative.

2. In the early days of photography there was no such thing as a prepared printing paper. It was necessary for the photographer to sensitize his own paper. The raw paper stock, being purchased with a coating of albumen on one side, was sensitized by floating it on a solution of silver salts. As this sensitized paper would keep for one day only, it was impractical to prepare more than enough for the day's work.

3. While this paper yielded most excellent and absolutely permanent results, the extremely tedious and troublesome manipulations necessary to prepare the paper for

use, such as making up the sensitizing bath, sensitizing, drying and fuming the paper, etc., all entailed such a great deal of work, it made photography for the amateur almost prohibitive. Those who did stick to the work were compelled to employ professionals to finish from their negatives, and as few professionals cared to bother with amateur work, his pictures were usually slighted in the finishing. The constant cry for better results, or a more simplified process of printing, soon led to the manufacture of a ready-prepared product which could be manipulated by the non-professional. So today we have numerous papers, all giving different effects. The majority of these papers are good, and it is only a matter of judgment on the part of the photographer as to which surface and kind of paper is best suited to his quality of negatives.

4. The first ready sensitized papers manufactured, and that proved a revelation in their manipulation, over the old albumen process, were the collodion and gelatin papers. They supplied a high gloss surface and at one time were universally used by the photographic profession. Although many other processes have come into popular use since, the glossy paper is still indispensable for many commercial purposes. The principles involved in the manipulation of this paper are extremely simple and form the foundation for other printing processes.

5. Before entering upon the instruction for printing and toning of sensitized papers, it is necessary to have some idea of the chemical composition of sensitized printing-out papers. Without going into detail we will explain as follows:

6. It is first of all essential that the raw paper stock employed in the manufacture of these papers be chemically pure, as the paper supplies the foundation upon which the sensitive emulsion rests and any impurities in the raw stock will affect the emulsion to the extent that uniform and permanent results would be uncertain.

7. The manufacturer's first operation in preparing the raw paper stock is to size it, *i. e.*, coat it with a substance

that fills the pores of the paper and gives a good, smooth surface.

8. After the paper is sized, it is sensitized by coating with a solution of either collodion or gelatin, chloride of silver, and other chemicals which aid in preserving the emulsion. After being sensitized the paper is allowed to dry, when it is ready for use.

9. **Theory of Printing.**—The paper is placed in a printing frame, under a negative, and exposed to daylight. At once the color begins to change, the exposed parts assuming a pink tint, then a reddish brown or purple color, and finally, if allowed to print for a sufficient length of time, the most exposed parts become extremely deep, causing a metallic lustre, or bronze appearance. The discoloration is due to the decomposition, by light, of the sensitive silver salt in the emulsion on the paper. Silver chloride is one of the chemicals forming a large portion of the constituents of the emulsion, and this substance loses its chlorine upon exposure to light and approaches nearer to the metallic silver. The bronzing of a much exposed print is due to the substance having become almost pure silver. To assist in the formation of the visible image free silver nitrate is present in the emulsion (to absorb the chlorine set free on the reducion of the silver chloride), besides citric acid and many other chemicals. Silver nitrate and citric acid are soluble, *i. e.*, they dissolve in water, while the silver chloride and its colored products of decomposition are insoluble.

10. **Theory of Washing.**—The paper when sufficiently printed is removed from the frame and given a preliminary washing in water. This washing is necessary in order to remove, or wash out, from the emulsion the soluble compounds, so that only insoluble ones are present during toning. There are two reasons for this; first, a gold toning bath is ordinarily alkaline and, therefore, all acids (such as citric acid) must be washed out of the emulsion; second, silver nitrate will seriously interfere with the gold chloride in the toning bath, and must be removed. So important

is the removal of the free silver nitrate that a salt bath is sometimes used before toning, the bath being a weak solution of ordinary kitchen salt. Salt or sodium chloride, chemically speaking, reacts readily on the silver nitrate and produces an insoluble silver chloride. The sodium nitrate which has been formed by this reaction readily washes out of the emulsion. A bath containing a pinch of salt to sixteen ounces of water will insure the destruction of all free nitrate; consequently, washing in water will remove all remaining soluble chemicals from the emulsion. Thus, all that is left in the emulsion prior to toning is a colored image, consisting of reduced silver compounds in the gelatin or collodion film.

11. **Theory of Toning.**—The print is next toned, in order to impart to it a pleasing color and to render the image permanent. The light-affected salts of silver possess the power of precipitating many metals when the salts of these metals are in solution. In more simple language this means that an image formed on a printing-out paper, if placed in a solution of say gold chloride, will cause the gold chloride to decompose and the gold to be precipitated. Theoretically speaking, it would be possible to employ any metallic salt, but in practice gold and platinum have been found to give the most lasting service.

12. The toning bath may be prepared by making up a very weak solution of gold chloride and rendering it slightly alkaline with bicarbonate of soda, or borax.

13. As a print lies in this solution, the silver forming the image in the emulsion causes the gold bath to be decomposed, and exceedingly fine particles of metallic gold are deposited on this silver image, thereby coloring it first brown, then chocolate, afterward purple, and finally blue black. Each particle of gold chloride that is thus split up gives off its chlorine, which unites with the silver of the image and forms the silver chloride. It will thus be seen that for each atom or particle of gold deposited we get at least one atom of silver converted into a soluble substance, and thus the image is robbed of that silver. This is one

PORTRAIT

Study No. 2

By John Garo

See Page 385.

A TOKYO WATERWAY

STUDY No 3 — BY WM. H PHILLIPS

of the reasons why an overtoned print becomes weak. When the necessary amount of gold has been deposited, or when the print is sufficiently toned, it is again washed in water in order to remove the residual solution from the film.

14. As it is essential for the gold toning bath to be alkaline—that is, not acid—advantage may be taken of a neutral salt, such as common salt, to check toning abruptly, but it is far better to omit this if possible, as there is a danger of its interfering with the image.

15. **Fading of Prints.**—It was previously stated that citric acid is present in the emulsion of printing-out papers; this will decompose hypo and liberate sulphur. If alum be present as well, we will also get sulphureted hydrogen. Most combined toning and fixing baths contain alum and hypo; therefore, if a print be placed in such a solution these two undesirable products are sure to cause a reaction with the silver in the image and form *silver sulphide.* The emulsion also soaks up a certain quantity of the solution, and some of the sulphur contained in the solution is likely to be precipitated with the metallic salts. This will itself eventually react with the image and cause fading deterioration. The combined baths cannot therefore be recommended when permanency is desired, and it is by all means recommended that separate toning and fixing baths be employed.

16. **Softening of the Film.**—The length of time required for the print to be in the various waters and baths tends to soften the emulsion, and it is advisable in many instances, especially where the temperature is quite warm, to harden the film in order to render it less liable to abrasion; and if it is desired to glaze the prints by placing them on glass or ferrotype plates, it is advisable to harden the emulsion to insure the prints peeling off without difficulty. A 5% solution of alum is usually employed, which when used requires that a thorough washing must be given between hardening and fixing; because if any of the alum is carried into the hypo bath the sulphur in the latter solution will be liberated in the manner already stated.

17. A better hardener would be a weak solution of

formalin, as no ill effects will come from this chemical. Formalin should never be used until after prints are toned, as it is so penetrating that if used before toning, it would be difficult to tone the prints evenly.

18. **Finishing the Print.**—The fixing bath being prepared with hypo, we have again a substance containing sulphur to deal with. After fixation is complete, which takes at least 15 minutes, the final washing of the prints has to be given to secure the effectual removal of the last traces of hypo.

19. The prints should be washed in at least 10 changes of water, each washing to be of 5 minutes duration. Although the great bulk of hypo is removed from the emulsion in the first three changes, yet, in order to entirely eliminate all of the hypo thorough washing is very necessary.

20. To secure the best results when enameling printing-out papers, the prints should have a bath of 5% formalin (Schering's Photo-Formalin 1 oz.; Water 19 ozs.) either before, or after, fixing and washing. As a hardening agent formalin is far preferable to an alum solution, which latter should never be employed for gelatin papers unless formalin cannot be obtained. The alum solution is quite likely to cause fading, no matter at what stage of the proceedings it is employed. If it is impossible to secure, or if you do not care to use formalin, or the alum solution, it is advisable to dry the prints without placing them on the glass or ferrotype plate. After they have dried, the gelatin becomes much harder, so by re-wetting them there is less chance of their sticking to the glass or ferrotype plate.

21. Finally, the medium employed for mounting the print must be neutral, not acid. A mountant, or paste, which will turn blue litmus paper red should never be used. The acidity acts upon the gelatin, possibly on the mount and the paper base of the print, and a yellowing of the image, or partial bleaching may result. Gold toning and fixing baths should all be neutral, or used slightly alkaline—never acid.

CHAPTER II.

Warm Tones on Gelatin Glossy Paper.

Brief General Instruction.

22. **Necessary Material.**—The following material is necessary for toning glossy prints:

Four trays of good size. If many prints are to be toned, the trays should not be smaller than 14x17 inches. This size is sufficiently large for prints up to and including 8x10. The trays should be at least 2½ to 3 inches deep. For washing and fixing the prints an ordinary wooden tray lined with oil cloth will answer, but for the toning baths either rubber, porcelain or glass trays should be employed. Each tray should be used for one particular purpose only. It will, therefore, be necessary to have a tray for preliminary washing of the prints, one for toning, one for fixing and another for final washing. In addition to the printing paper it is necessary to have the following chemicals: Chloride of gold, acetate of soda, borax, hyposulphite of soda and either alum or formalin.

23. **Printing.**—Gelatin and collodion glossy paper, in a general way, should be printed until the highest points of light are tinted only a little farther than you desire the finished print. Pay no attention to the shadows.

24. **Washing.**—The prints must be washed through six changes of clear water, handling them over each time. In washing the prints it is necessary to eliminate two things, *i. e.*, the free silver and the preserving chemical, because unless the prints are thoroughly prepared they will not tone evenly and thoroughly.

25. **Toning.**—When thoroughly washed the prints are to be toned in the following bath, which should be prepared at least two hours before using, so as to give it an opportunity to ripen:

26. STOCK SOLUTION NO. 1.

Chloride of Gold.....15 grs.
Pure Water.....15 ozs.
or, 1 gr. of gold to the ounce of water.

Place the chloride of gold in a bottle and add the 15 ozs. of pure water. Shake well until all the gold is dissolved. Label this bottle "Gold Stock Solution No. 1."

27. STOCK SOLUTION NO. 2.

Acetate of Soda.....1 oz.
Water.....10 ozs.
This makes a 10% solution.

Dissolve this chemical thoroughly by shaking, and label the bottle "Acetate Stock Solution No. 2." It is well to use at least a 14 ounce bottle for this solution, as the acetate of soda is dissolved more readily in a large bottle.

28. STOCK SOLUTION NO. 3.

Borax Crystals.....2 ozs.
Hot Water.....6 ozs.

As borax crystals do not dissolve freely, it is advisable to use hot water for dissolving them. Label this bottle "Borax Solution No. 3."

29. **Preparing the Toning Bath.**—Into a two quart bottle or jar, pour 40 ozs. of distilled water and add 1 oz. of Stock Solution No. 1, also 1 oz. of Stock Solution No. 2. Thoroughly mix these solutions by shaking the bottle or stirring with a glass stirring rod and allow to stand and ripen for at least two hours. There will be no harm in allowing it to stand for a day before using.

30. **Testing the Toning Bath.**—After the bath is ripened it is necessary to test it and ascertain whether it is alkaline, acid or neutral, and for this purpose a piece of red litmus paper is first employed. As a general rule this litmus paper will not alter its color in this case, which goes

to show that the bath is neither neutral nor acid. The gold bath, however, must be in a slightly alkaline condition in order to secure the best of results in toning. Therefore, if there has been no change in the color of the litmus paper, add a few drops of Solution No. 3, stirring the toning bath in the meantime so that the borax will be thoroughly and uniformly distributed throughout the whole solution. When the red litmus paper turns blue inside of two minutes, enough borax (Solution No. 3) has been added.

31. The average prints should tone in this bath in from 6 to 8 minutes. If the highest points of light in the prints bleach and become perfectly clear before there has been any material change in the color of the shadows, it will be necessary to add more of Solution No. 3 (borax) regardless of the color of the litmus paper. The alkaline Solution No. 3, acts as a restrainer on the highlights, and the amount of this solution to use is the amount necessary to hold the whites from bleaching while the shadows tone, or change to the desired color. An acid gold bath bleaches out the more delicate portions of the prints, makes pink whites and weak shadows and tones slowly. The final color of the print is regulated wholly by the amount of toning given the print in the gold bath.

32. **Washing After Gold Bath.**—Wash the prints in three changes of clear water by handling them over. Do not try to wash the prints by placing them in running water, as they are apt to stick together, in which case the gold solution on the surface of the print will not be removed. If any length of time elapses before placing the prints in the fixing bath, the toning of the print will continue wherever the gold has not been removed by washing, causing spots on the prints.

33. **Fixing Bath.**—After the prints have been carefully washed they may be allowed to stand in the water for the short time necessary to prepare the fixing bath. This bath is composed of 2 quts. of water and 6 ozs. of hyposulphite of soda; or, if hydrometer test is used, the bath should test

18°. More uniform results will be obtained if the hydrometer test is employed. The prints must be continually handled in the fixing bath for a period of 20 minutes in order to secure a complete elimination of all unused sensitive salts.

34. **Washing After Fixing.**—When thoroughly fixed the prints should be transferred, one at a time, into a tray of fresh water. They should receive from 16 to 20 changes of clear water during a period of one hour. If running water is used the prints must occasionally be picked over, as they are bound to sink to the bottom and the hypo and other chemicals will not be completely removed, even in running water. Careful attention must be given to this feature, as it is important in order to insure permanency of the prints.

CHAPTER III.

Warm Tones on Gelatin Glossy Paper.

Detailed Instruction.

35. **Temperature.**—All wash waters and baths should be exactly the same temperature from the beginning of the washing of the prints until they are ready to mount, the proper degrees being from 65 to 70 Fahr. If the temperature is uniform throughout all operations, the prints will be kept from softening and blistering.

36. **Preparing the Toning Bath.**—Care should be exercised to follow the general directions.

Do not use any more of Solution No. 3 than is absolutely necessary, or the bath will become too strongly alkaline, resulting in muddy tones.

37. **Keeping Qualities of Sensitized Paper.**—When buying sensitized paper in quantities, great care should be observed in storing it. Most of these papers are dated by the manufacturer, and the keeping qualities are generally good for about four months from the date stamped on the back. If allowed to become damp the paper will spoil and print poorly, disagreeable tones being the result. If kept in too warm a place the paper will rapidly turn yellow and it will be impossible to make prints with pure whites. The paper should, therefore, be kept in a cool, well ventilated cupboard or drawer.

38. **Action of Light.**—Whether the paper has a collodion or a gelatin-chloride coating the action of the light is the same. This coating contains nitrate of silver and is sensitive to the light. When exposed to strong daylight

it turns dark. Gas, electric, or lamp light has practically no affect upon it whatever; neither will it be affected by exposure to very subdued daylight for a short period of time. Therefore, all operations in handling the paper when placing it in a printing frame may be conducted in weak daylight, instead of in the dark room.

39. **Printing.**—The sensitive emulsion of gelatin and chloride glossy paper is only on the surface and does not penetrate through the film. Because of this, the printing will be only on the surface of the emulsion and the wash waters and chemicals used in toning will not penetrate beyond this surface. Therefore, printing for glossy surface papers is carried only a little farther than you desire the finished print; just sufficient to make up for the strength lost in the washing, toning and fixing, which is about one degree.

40. The length of time required for a print to be printed to the proper depth depends not only on the quantity and brilliancy of the light, but also on the density and color of the negative. A negative with a yellow tint will print slower than one of gray. Under any circumstance, without regard to the quality of the negative, print for the highlights—the shadows will take care of themselves.

41. **Printing From Negatives of Different Strength.**—Negatives of various kinds require different depths of printing. For instance, a hard negative—or a slow printing one—will require longer printing, in order to tint the highlights. Consequently, you must print deeper into the emulsion than with a soft or weak printing negative. Because a hard negative prints slowly, it gives a more solid print than a thin negative. On account of the great density of the plate, the highlights are restrained from printing until the shadows have received considerable exposure to the strong light. The light, therefore, penetrates the emulsion deeper in the shadow portions than in the highlights. By the time the highlights are properly printed the shadows will be printed sufficiently deep. By printing both highlights and shadows slowly they will not lose any of their

strength in the washing. Therefore, a hard negative—contrasty and a slow printer—should not be printed quite as deep as a soft negative. Print until the highlights are but slightly tinted, or about one shade deeper than you would desire the finished picture to be.

42. **Printing From Soft or Quick Printing Negatives.**—A soft, thin negative, owing to its printing so quickly, prints on the surface only, unless it be exposed and printed in the shade instead of bright sunlight. In fact, a thin negative should always be printed in the shade for the best results. Even then the highlights must be carried farther (printed deeper) than with a slow printing negative. In other words, with a weak negative it is advisable to carry the glossy print in the printing two shades darker than you wished the finished print. The printing is thus carried more deeply into the emulsion. When the prints are thoroughly washed the excess printing is well washed out, leaving the solid image, which is well printed into the emulsion; while if the print had only been printed on the surface, it would have lost its strength in the washing, resulting in a weak print. Therefore, remember that the slower you print from such a plate the deeper it will penetrate the emulsion. By slow printing we mean that you should print in the shade, or, if you must print in the sun, cover your negative by attaching two thicknesses of very fine tissue paper over the face of the printing frame, thereby filtering the light. Ordinary negatives of medium strength can be printed in bright sunlight with good results, but a slight diffusion of strong light will invariably give stronger and better prints.

43. **Examining the Prints During Printing.**—Great care must be exercised in examining prints while printing. First, see that your hands are perfectly dry. When bending back the paper to examine the print, be careful that you do not bend it too abruptly or too far back, as such action is liable to cause cracks or breaks in the surface. (See Illustration No. 1, on how to grasp the paper in examining the print.) Also be careful that you do not hold the paper

in too strong a light. While printing-out paper is not extremely sensitive, it is sensitive enough to become tinted even in subdued light if the light strikes it for any great length of time. This tinting is similar to fog and will destroy delicate highlights. If you find, while printing, that there are specks of dust on the negative, do not try to blow them away but remove them with a camel's hair brush. (See Illustration No. 2.) When blowing on them you are apt to carry saliva onto the plate, and the least drop of saliva would cause the paper to stick to the negative, thereby producing a spot which is almost impossible to remove, and which would produce white spots on all subsequent prints.

44. **Prints Sticking to Plate.**—If the paper should happen to stick to the plate, at once remove the print and place the negative in the regular negative hypo bath, and allow it to remain until the film becomes soft enough so that you can remove the paper which sticks to the negative. After the paper is removed, again place the negative in the hypo for at least twenty minutes, after which wash and dry. The hypo will remove the silver that was in the paper, unless the print was allowed to dry on the negative. Even then the stain frequently may be removed and the spot not show when printing. Do not examine prints oftener than is absolutely necessary. With a little practice you will soon be able to judge the total time required for a print to be printed to the proper depth and you will not need to examine it so often. Always carefully clean the back of your negative. Particles of dirt or stain will cause spots on the print.

45. When you remove your prints from the printing frame place them at once in a light-tight box, and only remove them from this box when you are ready to tone. Keep the fingers off the surface of the prints, as acid coming from the moisture in the hands, even when apparently dry, will penetrate the paper and thus cause red spots. Where one's hands freely perspire it is advisable to bathe

Illustration No. 1
Examining Prints
See Paragraph No. 43

Illustration No. 2
Removing Dust from Negative while Printing
See Paragraph No. 43

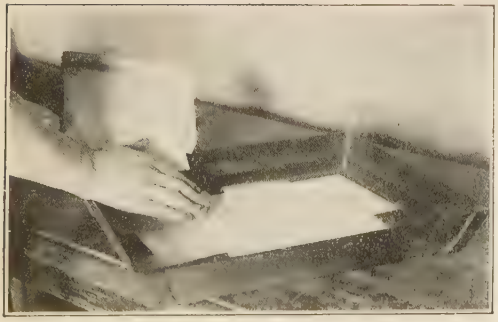

Illustration No. 3
Placing Prints in Washing Tray
See Paragraph No. 48

WHERE THE BROOK WINDS THROUGH THE MEADOW
STUDY NO. 4 BY WM. T. KNOX

them in a weak solution of bicarbonate of soda and dry them thoroughly.

46. **Trays for Washing and Toning Prints.**—Many failures are caused from negligence in caring for trays. One should have at least two washing trays, besides one for toning and another for fixing. It is a good plan to label your fixing and toning trays to avoid mistakes. Never use the toning tray for anything else than your gold toning, nor your hypo tray for any other purpose than fixing. Always use the same tray for the same purpose, and the same bottles for the same chemicals. All trays should be thoroughly cleansed with salt and water, using a small handful of salt and only sufficient water to moisten the salt. The trays must be scoured sides and bottom, and be thoroughly rinsed before using and again thoroughly rinsed after using. Trays should never be stacked one on top of another, but each placed carefully away by itself, with the hypo tray as far from the toning and washing trays as possible.

47. **Washing Prints.**—This part of the operation is one which is often carelessly done, with poor tones as the result. Use large trays and plenty of water. It is most important that the preliminary washings be thorough, as streaky and muddy tones, and slow toning, are caused from insufficient washing. The preliminary washing should take at least 30 minutes, and 15 minutes more devoted to the washing will save that amount of time in toning. Insufficient preliminary washing will prevent proper action of the toning bath, resulting in uneven toning, red or muddy prints.

48. **Placing the Prints in the Washing Tray.**—Place all the prints on a piece of cardboard or paper, face down, and hold in your left hand. With the thumb of the right hand slide one print at a time into the water. Immerse each print completely before adding another. Never slide one print over another, unless the under print is thoroughly wet. (See Illustration No. 3.) After the prints have been placed in the water pick them over, one at a time, and

turn face up. Do this until all the prints are turned over, then proceed and reverse the prints, placing them face down, by picking them over one at a time. This should require, ordinarily, about five minutes for each change, after which empty the tray and add fresh water. Proceed as before, picking over the prints. If done conscientiously, you can rest assured that in half an hour the prints will have been properly washed and all trace of the free silver and preservative chemicals will have been eliminated.

49. Gelatin paper usually contains more silver than collodion coated paper. Consequently, when washing gelatin paper you will find that it will liberate the silver more freely. This you will recognize by the discoloration of the water, which will more freely become white or milky. It is important, therefore, that the gelatin prints should be handled and washed by hand, and have at least eight changes of water not warmer than 65 degrees to 70 degrees Fahr., each change requiring from three to five minutes.

50. Gelatin prints also have a tendency to sink to the bottom of the tray and mat—stick—together and no matter how often you change the water, unless you pick them over and over the silver and other preservative chemicals will not be eliminated.

51. **Chloride of Gold** is obtained by dissolving metal gold in nitro-muriatic acid. It is red-orange in color, dissolves readily in water, and for convenience is put up by the manufacturers in 15 gr. tubes or bottles. It is used for toning the prints—producing the proper color—and is therefore called the toning agent. Chemical action generally acid. It is sometimes, however, obtained in neutral form.

52. **Borax.**—Borax is found native in the crude state in the saline portions of Nevada and California, but is also manufactured by boiling boracic acid (crude) with sodium carbonate. It is put up both in crystal and powder form. We advise the use of the crystals, as there is less danger of adulteration. It is colorless. As it dissolves slowly in cold water, hot water should be employed for the purpose.

53. **Acetate of Soda.**—A colorless crystal. Also ob-

tainable in granular form. Dissolves readily in water. If exposed to heat or air it loses its water of crystalization rapidly and becomes a white powder. When in powder form it is twice as strong as the crystals. It is used in the toning bath for preventing the highlights from bleaching. It is a very slightly alkaline chemical. When added to water it requires hours for the solution to become noticeably alkaline.

54. **Hyposulphite of Soda.**—(Thiosulphate of Soda). Commonly called " hypo." Is put up in crystal and granular form. Colorless. From this you prepare your fixing bath. The action on the prints is identically the same as on the plates, as it dissolves all the free silver which has not been eliminated in the washing and toning baths.

55. The chemicals employed in toning may be divided into two principal classes—**acids and alkalies.** Both must be used in preparing the toning bath, but it makes a great deal of difference which is in the greater proportion. If proportions of acid and alkali are equal the bath is said to be neutral. It will give fair results in this condition, but as it never should be used to tone in an acid condition, it is safer to make it slightly alkali. To test the bath for this use litmus paper, which is of two colors, red and blue. Red litmus paper coming in contact with an alkaline bath will turn blue, while blue litmus paper coming in contact with acid turns red. A neutral bath will have no effect on either red or blue litmus paper.

56. **Litmus Paper.**—The best litmus paper to use for testing your gold bath is that put up in small glass vials, and a small bottle will last a long time. You should have a bottle of blue as well as one of red litmus, for should your bath become acid from continuous use you can test it with blue litmus paper. The preservative which is used by the paper manufacturers in preparing the paper, and which may not be entirely eliminated with the wash waters, is apt to turn the bath acid after quite a few prints have been toned. It is well to keep a piece of blue and red litmus paper in the bath while toning, and watch them carefully.

As soon as you notice the slightest change take immediate steps to have the bath test properly.

57. It will require about two minutes for the red litmus paper to turn blue after having added the borax, or Solution No. 3. If the small quantity of Solution No. 3 you have added does not perform the work in the given time, add more borax solution and continue to add until the litmus paper does turn blue.

58. The fresher the paper the more preserving chemical it contains; therefore, you require so much more of your Solution No. 3 than you would for old paper, while with old paper you will require more of the gold or Solution No. 1, owing to the fact that old paper requires a stronger gold solution when toning than fresh paper, but it does not require as much alkali, as the paper contains less acid. The amount of gold given in the formula is the minimum that should be usd for toning. You may find it necessary to use a trifle more, and in this you will be governed by the speed of your toning bath. It is not advisable to tone too quickly or too fast, as tones produced by fast toning are generally only surface tones, and when the prints enter the hypo the tones change considerably. Usually about six to eight minutes is required to completely tone a print.

59. Before printing any paper notice whether it is old or fresh. If it is old you will find that the paper will be slightly discolored either around the edges on the surface or on the back. Should you be compelled to print from both old and new, separate them, toning the old paper first and the new last. The reason you tone the old paper first is because your bath is fresh and crisp and the old paper needs crisping a trifle, which it will receive in a fresh bath. After your old paper is toned your bath is in better condition to tone fresh paper, because it will contain a certain amount of free silver, which ripens the bath, and your fresh paper will not tone quite so quickly but much more evenly than it would in a fresh bath.

60. We caution you again on the condition of your

bath. It is absolutely necessary that the bath be not too alkaline, and must never be acid, but should lean a little over the neutral point to a slightly alkaline condition. A bath too alkaline will give muddy whites. A bath that turns red litmus paper blue in from one to two minutes is just right.

61. **How to Tone.**—We will now suppose that your Toning Bath has ripened ready for use and the prints are carefully washed, as instructed. Immerse one print in the Toning Bath and with the right hand spray the solution over the print as you watch it toning. You will find that the print will first turn red and gradually the whites will begin to clear and the red will commence to soften down considerably. If the highlights and shadows tone evenly, the bath is working properly. Should the highlights tone chalky, eat away as it were, and the shadows refuse to tone, or change color to any great extent, then the bath is not sufficiently alkaline and a few drops of borax should be added. If the print tones too slowly add a trifle more gold, but before adding the gold it must be neutralized. To do this pour, say two drams of the gold stock solution into a graduate containing two ounces of water. To this add a few drops of your Solution No. 3, the borax, and test with litmus paper. As soon as this gold solution tests alkali, add a dram at a time to the bath until it tones freely. If your bath tones too fast, add more water until your prints tone in from six to eight minutes. A fresh bath will always work more quickly at first than it will after being used a while, so due allowance must be made for this.

62. After you have made these tests and find that the bath is toning properly, you can proceed to tone the balance of the prints. For the beginner, we would advise having no more than 10 or 12 prints in the toning bath at one time. These should be placed in the bath, face down, and moved rapidly from one end of the tray to the other. For those who have had some experience, 15 or 20 prints may be placed in the bath one at a time, and when these prints are partly toned another lot of 15 may be added. When

the first lot is finished a third lot should be added, repeating this operation until the entire batch is toned.

63. While the prints are in the toning bath always watch the highlights (by this we mean the whitest part of the print), and if they clear in the time required for the shadows to tone, you will know that the bath is still working properly. Should the highlights tone chalky, after quite a number of prints have been toned—eating away as it were—and the shadows refuse to tone, then you will recognize that the bath has become acid and a few drops of No. 3 Solution (borax) should be added.

64. The first print is apt to tone a little harsh, therefore Solution No. 3 must be added carefully. Better still, add a second print after adding a few drops of No. 3 and see if it does not tone better than the first. Tone these two prints until the highlights or white portions are pure white, allowing the shadows to remain quite warm, almost red, but clear. There must be a reasonable amount of detail in the highlights—they must not be chalky. When your bath tones your test prints to the desired shade in about 6 minutes, the bath is right and ready to receive the balance of prints. Usually a bath will need no altering if it is properly prepared at the start, and an entire batch of prints can be toned without any change in the bath.

65. In order to judge when the highlights are clear place a fresh print in the bath and compare it with those that you are toning. You will notice by the comparison that the fresh print is muddy in the highlights (the whites), while the toned one is clear and crisp. At this stage remove the toned print from the bath to a tray of water and continue to tone the remainder of the prints, watching the action of bath closely. Never have more prints in your Toning Bath than you can handle comfortably so as to insure even toning, and always try to tone all of the prints the same color and depth of tone. Do not have one toned almost blue and another one very warm, but remove them all from the gold bath at exactly the same stage. Remember, after toning a number of prints the acid in the paper

is apt to turn the bath to an acid state, and it may be necessary to add a few drops of Solution No. 3 (borax) from time to time, to hold the bath in the proper alkaline condition.

66. The amount of bath recommended in the formula should tone 25 cabinet prints, or their equivalent, without any change or alteration. The temperature of the bath should be 65 to 70 degrees Fahr. A toning bath too cold will cause slow toning. A toning bath too warm will be apt to soften the surface of the prints and also cause surface toning. The toning must be done by weak light, as the paper is more sensitive when wet. When you get the bath to working evenly, judge your tone for the highlights and middle tones, as previously directed. Pay no attention whatever to the deepest shadows; allow them to care for themselves, for when the highlights are round and mellow, the shadows will be rich and velvety. As soon as the halftones are clear remove the prints from the gold bath and place in a tray in which there is plenty of water. If possible place them in running water. After the prints are all toned give them a few changes of fresh water, carefully picking them over and over during the washing. They are then ready for fixing.

67. **Life of a Toning Bath.**—A Toning Bath is good as long as it will tone prints in a reasonable time. The formula given will tone 25 cabinet, or 4x5 prints, or their equivalent. If a greater number of prints are to be toned, prepare a larger bath in the same proportions; if a less number are to be toned, use a smaller bath. A good plan for the beginner who has only a few prints to tone is to use only a portion of this bath, enough to tone the prints. When through toning pour the bath into a separate bottle and label "Old Toning Bath." The next time you desire to tone use half of the old bath and half fresh solution. During toning if you find that the bath is toning slowly, having become exhausted by the number of prints toned, simply strengthen by adding fresh toning bath, or more gold and enough borax to neutralize the gold. Should you find it

necessary to strengthen the bath by adding more gold, and should you add the chloride of gold (which is acid) without neutralizing, you would be adding a certain amount of acid, which would cause the entire bath to become acid. To avoid this, when you wish to strengthen the toning bath pour one ounce of gold solution in a graduate and add a few drops of No. 3, the borax solution. Place in the graduate a piece of red litmus paper. When this turns blue you will know that you have added enough borax. You should not add this neutralized gold to the bath at once. Allow it to stand so that it will ripen for about five minutes. Never add any more acetate of soda to your bath after you begin to tone, as it will have no effect unless added to the bath an hour or so before toning, thus giving it an opportunity to ripen.

68. **A Desirable Tone.**—A very pretty tone for a print, especially if it is a landscape, can be produced by toning only until the highlights are cleared up pure and white, but not bleached; retaining all the detail and leaving the shadows a beautiful deep red. Be careful that the highlights do not tone faster than the shadows, leading to flat, bleached whites and shadows that cut off muddy in the hypo. If your bath were acid you would find that the whites would have a pinkish tint and would be apt to bleach. If too alkali the shadows would take on a very muddy tone. Have the bath just sufficiently alkaline to tone the shadows at the same speed as the highlights and reach the proper shade in from four to six minutes. By manipulating the gold bath, printing-out papers in general can be toned to any desired color, from a warm sepia to a deep rich purple.

69. For glossy or highly glazed papers a warm red tone is more pleasing and suitable. Therefore, the formula given in this instruction is for warm tones. Remember that muddy whites with streaky shadows are caused by too much alkali in the gold bath. Blue edges and muddy shadows are caused by toning too slow in the gold bath, the bath not having enough gold in it. Also from insuf-

MORNING GOSSIP—BRITTANY

Study No. 5

By W. G. Corthell

WOODS IN SPRINGTIME

Study No. 6

See Page 385

By W. H. Porterfield

ficient handling of the prints in the bath, or by using old paper. No print should remain in the gold bath longer than from 6 to 8 minutes.

70. **Fixing.**—After all the prints are toned they are ready for fixing. The fixing bath is prepared according to formula given in Paragraph 33. With the left hand drop the prints, one at a time, into the hypo bath, being careful, however, not to allow the left hand to touch the hypo solution. With the right hand separate the prints, picking them over rapidly and immersing them so that the hypo will cover them evenly. Continue in this way until all the prints are in the hypo. Next pick them over and over for 20 minutes, turning them face down. In this way you insure perfect fixing.

71. **Washing After Fixing.**—After the prints are thoroughly fixed transfer them, a few at a time, into a tray of fresh water. This tray should be used only for washing prints after fixing, and for no other purpose. After all prints are in the wash water give them 16 to 20 changes of clear water, being careful to pick the prints over and over during each change of water. If the prints are carefully picked over they will be thoroughly washed in one hour. If running water is used the prints must be occasionally picked over and separated as the gelatin prints will sink to the bottom and the hypo will not be completely eliminated even in running water—this is important to insure permanency of the prints.

72. **Practice Work.**—For your practice work you should make a few prints on any gelatin glossy printing paper, selecting several negatives to print from, each of different strength. This will give you experience with the various qualities of negatives. It is also advisable for first experiments that you make at least three prints from each negative. Print the first one as deep as would be exactly right in your judgment; the second print carry a little farther than the first and the third print still deeper than the second. Number each print. Then wash, tone, fix and finish all exactly alike. In order to derive the greatest bene-

fit from your experiments, you should observe the appearance of the varying depths of printing during different stages of procedure and when the prints are all finished, mark on the back of each all data connected with the manipulation; noting the quality of negative, depth of printing, whether normal, deep or very deep, action in the toning bath, did the bath work properly, or whether it bleached the highlights. If the bath was altered, how was it altered? All this data will serve as a good guide for your future work. All prints should be dated and filed in the regular print file for future reference. Should you meet with failures during the manipulation, refer to the difficulty department, Chapter VI, where you will find the cause, prevention and remedy.

CHAPTER IV.

Purple Tones on Collodion and Gelatin Glossy Papers.

Brief General Instruction.

73. **Introduction.**—Preceding chapters have dealt particularly with the fundamental principles of handling glossy printing-out papers, as far as securing an average warm tone is concerned. These chapters must be thoroughly understood before proceeding to secure purple tones, as the producing of the colder tones requires simply a slight variation in the printing of the paper and in preparing the toning bath.

74. The tone of the print is governed, to a great extent, by the likes or dislikes of the individual worker, some persons preferring a warm, while others are partial to a deep or cold tone. For commercial purposes the latter is more acceptable. In either case, however, all that is required is correct printing for the tone desired and to have the toning bath work evenly.

75. **Printing.**—For purple tones it is necessary to print fully two shades darker than you desire the finished print; therefore, the printing will be one shade deeper than when warm tones are desired. Pay no attention to the shadows.

76. **Washing.**—Wash through six changes of clear water, handling the prints over each time, in order to thoroughly remove all free silver and preserving chemicals.

77. **Toning.**—The gold bath used to secure purple tones is slightly different from that employed for the producing of warm tones.

78. STOCK SOLUTION NO. 1.

Chloride of Gold.....15 grs.
Pure Water.....15 ozs.

79. STOCK SOLUTION NO. 2.

Acetate of Soda..... 4 ozs.
Pure Water.....10 ozs.

80. STOCK SOLUTION NO. 3.

Borax Crystals.....2 ozs.
Hot Water.....6 ozs.

81. **Preparing the Toning Bath.**—In a 2 quart bottle or jar, pour

Water.....40 ozs.
Stock Solution No. 1.....1 oz.
Stock Solution No. 2.....2 ozs.

82. Thoroughly shake the bottle containing this solution and allow it to stand for 10 hours, if possible. It may be used, however, inside of 2 hours, but better results will be secured if the bath is thoroughly ripened before being used. When ready to tone pour the solution into the toning tray; then mix in a graduate, 6 drams of Solution No. 1 and 4 drams of Solution No. 3, allowing it to stand for 5 minutes, when it may be poured into the toning tray and thoroughly mixed with the rest of the bath.

83. Place a piece of red litmus paper in the bath and gradually add a little more of Solution No. 3 until the red litmus paper turns in 2 minutes. This bath must be only slightly alkaline.

84. Before attempting to tone a number of prints, test the bath first with one print, and see that the shadows tone in about 8 minutes time and that the highlights clear in this time. Any shade from a warm cherry to a deep purple may be obtained, depending upon the depth of toning. The longer the prints remain in the bath the more purple or deeper will be the tone. If extremely cold tones are desired, less borax must be used, for a strong alkaline solution will cause yellow whites.

85. The color of the print must not be judged by looking upon the surface—hold the print up to the light and look through it, bearing in mind that it will dry a couple shades darker; therefore, if the tone is carried to a deep purple when examining it by transmitted light, a blue black color will result when the print is dry, and the whites will no doubt be muddy, for any tone on glossy paper carried beyond a warm purple will give unsatisfactory results.

86. **Special Acetate Toning Bath.**—Take 60 ounces of water, 1 ounce of the Gold Stock Solution No. 1, and add from 4 to 6 drams of a saturated solution of acetate of soda. This bath is intended to be used as soon as prepared, and as it will supply rich purple tones is recommended principally for commercial work. The bath should be used immediately upon preparing it.

87. Should the highlights in the first test print bleach before the shadows are toned, add more acetate of soda. If the toning proceeds too rapidly, dilute with water. If the bath works slowly, however, more gold must be added to the bath, always neutralizing the gold with acetate of soda before adding it, however.

88. The above bath is intended especially for small batches of prints, and should not be used when a great many prints are to be toned, for as the bath becomes a little used, the alkaline action of the acetate of soda grows stronger, and unless extreme care is exercised the tones will be uneven, flat and muddy.

89. **Washing After Toning.**—Throw the prints from the toning bath into clear water, until all are toned; then wash in three changes of clear water, handling them over in each wash water.

90. **Fixing Bath and Final Washing.**—The fixing and washing are exactly the same for all glossy papers, see Paragraphs 33-34.

CHAPTER V.

Purple Tones on Collodion and Gelatin Glossy Papers.

Detailed Instruction.

91. **Temperature.**—Too much emphasis cannot be laid upon the advisability of keeping all wash waters and baths at a uniform temperature, which should not exceed 70° Fahr.

92. **Depth of Printing.**—The quality of the negative has much to do with the required depth of printing, and this must be taken into consideration at all times, no matter what printing process is employed, or what tone is desired. For purple tones it is necessary to print a shade deeper than when warm tones are desired.

93. The necessity for deeper printing is explained by the fact that the toning is to be carried considerably further than for warm toning. All prints grow somewhat lighter in the toning, caused by the action of the toning agent; therefore, as you are going to tone deeper and longer, the print, unless printed darker, would become too light.

94. **Preparing the Toning Bath.**—In securing warm tones the acetate of soda is used to restrain the action of the gold upon the highlights. As deep toning will require more restraining of the highlights a greater quantity of acetate of soda must be used. Care must be exercised, however, in adding the alkali, for too much causes muddy whites, and the nearer neutral the bath can be worked for deep tones the purer will be the whites. Acetate of soda is a more neutral chemical than borax, yet as a restrainer

and purifier of whites, it is more advisable to employ it than to resort to borax.

95. Should the bath become too alkaline by adding too much borax, the prints instead of remaining clear in the highlights will turn yellow and in the resultant print will be extremely muddy. Never add acetate of soda to the bath after beginning to tone, as it will have practically no effect, except when using the special acetate toning bath.

96. When toning collodion-coated paper proceed in exactly the same way as for gelatin, but use a trifle more alkali, or Solution No. 3. Never tone gelatin and collodion papers together in the same bath, nor wash these papers together in the same tray.

97. **Flattening Collodion Prints.**—Collodion paper is apt to curl in washing; therefore, the following method of flattening should be employed: Pour sufficient fresh water into the washing tray to nicely cover the bottom, say one-fourth of an inch deep. Place the prints face side down, patting them with the palm of the hand to insure their thorough immersion. Place second print on top of first, partially over-lapping. Pat this print in like manner. Place all the prints in this way, spreading them over the bottom of the tray. When all prints are in the tray, allow them to remain for a minute; then pour off the water and set the tray on edge to drain for about two minutes. (See Illustration No. 4.) The reason collodion paper curls in the water is that the paper swells as soon as wet and the collodion emulsion does not. Therefore, if the print when first placed in the water is held flat, the paper swells in thickness only, and if the print is kept flat until the paper is thoroughly soaked in this position, it will remain flat during the entire manipulation. The tray can then be filled half full of water and the prints more freely handled, as they will not curl. Always keep them face side down, however, until washed. It is a good idea when using collodion paper to add a few drops of a saturated solution of common washing soda to the second washwater. This will neutralize the water and prevent red spots that may be

Illustration No. 4
Flattening Collodion Prints
See Paragraph No. 97

Illustration No. 5
Flattening Prints to Bottom of Tray
See Paragraph No. 168

AUTUMN

Study No. 7 See Page 385 By Wm. Spanton

caused by the perspiration on the fingers coming in contact with the surface of the papers while examining during printing.

98. **Using Old Toning Bath.**—The regular toning bath should be saved, and when you desire to tone again add one-half fresh bath to the old. A bath of this kind will give better results than a perfectly fresh one. Where the *special acetate toning bath* is employed, however, it should be used only once and then discarded. When large batches of prints are to be toned, the regular bath is to be preferred, as more uniform tones are secured with it than with any specially prepared bath. Allowance must be made for drying, as all prints dry fully one shade darker and colder than they appear when wet. After the prints are toned they should be washed and fixed in the usual manner.

99. **Ferrotyping Prints.**—If you do not wish to mount your prints they can be dried flat, and a beautiful glossy finish may be obtained by squeegeeing them onto a ferrotype plate. Provide yourself with half a dozen ferrotype plates. These plates are a Japan tin, similar to the old tintype plate, but are made in a heavier weight. They are supplied, when desired, in a larger size than is ordinarily used for tintype purposes. The small size can be purchased from photo supply houses at 10 to 15 cents a sheet. First, clean the plate with clear water and before placing the prints in contact swab the plate with the following solution:

Benzine	1 oz.
Paraffine	10 grs.

100. After the paraffine is dissolved, with a tuft of cotton apply it to the plate, which must be perfectly clean and dry. Rub over the entire plate and finally polish dry with clean cotton or cloth, being careful to remove all of the paraffine that appears on the surface, as enough will remain to do the work. Next place the print in contact. A good plan is to immerse the ferrotype plate in the tray of water with the prints and bring the print in contact with the ferrotype plate while both are beneath the water. In

this way most of the air-bells will be expelled. Next lay the ferrotype plate on a perfectly level surface and squeegee by covering with a dry blotter and rolling thoroughly with a print roller to expel all remaining air-bells.

101. After having rolled the prints perfectly dry on the ferrotype plate and expelled all air-bells, set the plate up on edge and allow the prints to dry until they drop off or can be removed easily by raising one corner with the penknife. Should the prints stick, the plate has not been properly prepared and the prints must be soaked off by placing back into the water. Then carefully clean the plate again and apply the paraffine solution. With a little care and practice no trouble will be experienced.

102. If desired these prints may be kept in an unmounted state. However, should you intend to mount them later—after rolling the prints dry—apply a coating of paste to the back of each print while it is still on the ferrotype plate. Any of the prepared or starch pastes will work very nicely. Allow the paste to dry with the print. We would recommend the use of prepared paste for this purpose. Although prints will dry a little slower when pasted, the paste will dry good and firm as the print dries, and will be found to adhere well to the mount when remoistened. The pasted backs of prints will not interfere with their handling unmounted and they can be kept in this condition as long as desired. When you wish to mount them, it can be done without losing the gloss, by either moistening the part of the card on which you are going to mount the print or by moistening the back of print. In the former case, after moistening the card lay your print on the card in proper position and weight it down—of course always be sure to put a piece of dry paper over the glossy surface of the print before you lay any weight on it. This weight will press the print firmly on the card and the moisture on the card will dampen the paste on the print sufficiently to make it stick firmly, yet it will not injure the high gloss secured by ferrotyping. Or, you can moisten the back of the print with a damp sponge, only wetting it sufficiently

to make the paste soft. Then by laying the print on the card and weighting as stated above, the paste will take a firm hold. Both methods can be adopted if desired—slightly dampening back of print and also card.

103. There is no danger of injuring the gloss on the print, provided you do not touch the surface with wet fingers or allow anything damp to come in contact with the face of the print. A good squeegee roller is necessary for mounting the dry prints which have been dampened in this way.

104. The Eastman Kodak Company manufacture a dry mounting tissue which is easily applied, and the prints will lay flat without curling even on the very thinnest mounts. The use of this tissue is fully described in the trimming and mounting section of this volume.

105. **Softening of Prints During Manipulation**—In event of prints softening during manipulation, where ice water cannot be obtained and a film hardener must be employed, we would recommend the following: If it is possible to carry the prints through the gold bath without softening, should they soften after the toning bath, place them in a hardening bath of formalin 1 ounce, water 9 ounces. Handle prints in this bath until the film becomes thoroughly toughened, then place them in plain water and give one change of water before fixing.

106. **Prints Softening in First Wash Water.**—If the prints soften in the first wash water, then a 5% solution of alum is best to use for the second water, and the prints must be carefully washed after hardening before entering the toning bath. The alum does not harden the emulsion as much as the formalin and therefore will not affect the action of the toning chemicals, as formalin is apt to do. In some instances the formalin prevents toning entirely, but this is not the case with alum, yet with the latter there is danger of sulphurization. Where absolutely permanent prints are desired the best way would be to get along without any hardener whatever, for where ice can be employed this will generally overcome any softening of the

film. Where one does not care so much about the absolute permanency of the prints, as is sometimes the case with commercial work, should they soften during manipulation, one-half ounce of any hardening solution added to each gallon of hypo bath will toughen the film. This hardening solution can be obtained from any paper manufacturer, or you can prepare it yourself as follows:

107. FORMULA FOR HARDENING SOLUTION.

Chloride of Aluminum	3 ozs.
Bi-Sulphite of Soda	2½ ozs.
Cold Water	12 ozs.

Place both chemicals in the water and shake well until all is dissolved.

108. **Alum Fixing Bath.**—The alum fixing bath is not recommended, but for those who prefer using it we give the formula for preparing it below:

Water	70 ozs.
Hypo	6 ozs.
Alum Crystals	2½ ozs.
Sulphite of Soda Crystals	⅜ oz.

When all is dissolved, add ¾ oz. borax dissolved in 10 ozs. of hot water. Stir this bath while adding the borax solution.

109. This fixing bath must be made up about ten hours before using, as it keeps indefinitely before use and it can be made up in large quantities. When using the alum baths prints must be thoroughly washed to eliminate all the alum from the print, and, therefore, washing by hand is important. Sixteen changes by hand should be sufficient for this.

110. **Practice Work**—For your practice work for purple tones, several prints should be made from different quality negatives. If you have followed instructions given in the first lesson, you should be able to judge pretty accurately the required depth of printing and your efforts should now be devoted to the obtaining of a purple tone. This may require some altering of the bath. Your first print should be toned in a normal bath made exactly ac-

cording to the formula; then for the benefit of the experience you will derive, you should alter the bath, first using a strong bath by adding more gold and next trying the bath with more alkali. In other words become familiar with the effects of little alkali, strong alkali, strong gold and normal bath. This will be good experience and will serve as an excellent guide for your future work. Note on the backs of your practice prints all data pertaining to your manipulation and file these prints in your proof file for future reference.

111. Should you experience difficulty in obtaining proper results by using part old and part new toning bath, prepare a fresh bath for each batch of prints. Allow the bath to stand and ripen a few hours before use.

CHAPTER VI.

Difficulties—Collodion and Gelatin Glossy Papers.

112. **Judging Depth of Printing.**—No set rules can be given regarding the depth of printing, other than "print until the highest points of light are from one to two shades darker than is desired for the finished print," the depth depending entirely upon the tone desired. Warm tones do not require as much printing as cold tones. Practice and close observation alone will enable you to judge accurately the desired depth of printing from a variety of negatives.

113. Before wetting the prints examine them closely, and remember as nearly as possible their appearance; then after they have gone through the various wash waters, toning and fixing baths, and finally been dried, examine them again. If they are too dark or too light, the error must be corrected in the next printing. After a little practice no difficulty will be experienced in judging the proper depth to print all classes of negatives. The secret of the success of a printer is measured by his ability to print from all kinds of negatives and produce uniform results. Continual practice, carried on in an intelligent and systematic manner, will enable any one to become expert in this work.

114. **Gold Bath Too Acid.**—If your gold bath tests too acid, simply add more borax until red litmus paper turns blue within two minutes. When adding borax be careful that you stir the bath so that the borax will become mixed with the entire solution.

115. **Gold Bath Too Alkali.**—If the gold bath tests too alkali, add a little more gold and a little more water. Add the gold, however, without borax; there is enough acid in the gold to neutralize the alkali already in the bath.

116. **Entire Print Weak.**—This difficulty you generally meet with when making prints from thin, weak negatives, but you will also produce weak prints from a strong, vigorous negative if you tone too slowly and use too weak a toning bath. If your negatives are thin print them in a soft, diffused light, so as to print them slowly, as the slow printing permits deeper printing into the emul-

sion. If the bath tones too slowly strengthen it by adding more gold and enough borax to neutralize it, so as to increase the speed of the toning. A bath too cold will give weak prints, too warm a bath will give mealy prints.

117. **Highlights and Half-Tones Bleaching.**—If prints bleach in the highlights and half-tones it is because the bath is acid. To overcome this simply add a little more borax; continue to add borax, a little at a time, until the bleaching ceases, even if the bath tests alkali before adding more borax.

118. **Whites Toning Brown and Muddy.**—This is a certain sign that your bath is too alkaline. Add a little more water and a little more gold, but add no more borax; do not neutralize the gold. There will be enough acid in the gold to counteract the strong alkali in the bath.

119. **Muddy Tones.**—If prints are flat in the shadows and refuse to clear up, it is because the bath is too alkaline, or your washing before toning was not thorough.

120. **Streaky Prints.**—These are usually caused by insufficient washing before toning, and sometimes by an acid toning bath; toning too fast, or too many prints at a time; not separating prints while toning. Be careful to see that the prints are picked over and over when washing. See that the bath is slightly alkaline, and if it tones too fast add more water. Never have more prints in your toning bath than you can handle conveniently.

121. **Slow Toning.**—This is caused by either too weak a toning bath (not using enough gold) or the bath being acid, but more generally caused by insufficient preliminary washing. Still another reason would be using a toning bath too cold. The toning bath should be worked at from 65 to 70 degrees Fahr.

122. **Edges Toning Blue, Center of Print Toning Even.**—This will occur if your bath tones too rapidly, if it is strongly alkali, or if the prints are not continually moved while in the toning bath. If the bath tones too rapidly add more water; if too strongly alkali, neutralize by adding water and enough gold, without adding more borax to neutralize the alkali already in the bath. Or, if the bath is much too alkali, a drop of nitric or muriatic acid C. P. added will have the effect of neutralizing it.

123. **Judging When Prints Are Toned.**—A print is completely toned when it is clear and crisp throughout. You should judge the print by raising it from the bath and looking through it, and not by looking upon it while laying in the bath, as it may look clear upon the surface and not be clear throughout. If by looking through the print it appears clear and brilliant—not muddy and bricky—it is then fully toned. If patches or streaks exist they must

be toned out before the print is fully toned. The final color of the print is a matter of individual taste.

124. **Black Spots With Comet-like Tails.**—These are found either in the wash waters or toning bath, and are caused by iron rust coming from the water pipe and settling on the surface of the paper. Filter the water and use a little salt in the first wash water.

125. **Pink Whites.**—These are caused by an acid toning bath. Neutralize by adding a little borax.

126. **Bleaching While Fixing.**—All prints will grow somewhat lighter in the hypo, but this is not bleaching. When a print bleaches in the hypo, the highlights, or whitest parts of the print, lose in detail—become chalky—and turn a bluish tint with shadows weak and mealy. This is generally caused by the use of an acid hypo bath. Carefully test your hypo with litmus paper, and if you find it is acid, add a little carbonate of soda or borax solution until red litmus paper turns slightly blue in two or three minutes. Always have the hypo bath slightly alkali.

127. **Surface of Prints Softening in Wash Waters.**—This will not occur where cold water is used, and will only happen during the summer months when the water is warm enough to cause the emulsion to soften. If cold water cannot be had to overcome the softening, add to the second wash water one-half ounce of saturated solution of alum to every 60 ounces of water. Add the alum before admitting the prints and see that it becomes thoroughly mixed with the water. This will harden the emulsion on the paper and the prints can then be handled without damage to the surface. It is necessary, however, that the prints be thoroughly washed after this alum bath; otherwise, you will carry the alum into the toning bath, which will result in uneven tones.

128. **Surface of Prints Softening in the Fixing Bath.**—If the prints soften in the fixing bath, it is either because the fixing bath is strongly alkali, or very warm. Handle them as carefully as possible while fixing. After they are fixed and you have given them one change in fresh water, transfer them to a tray of water to which has been added one ounce of saturated solution of alum to every 60 ounces of water; or place them in a 5% solution of formalin. Pick the prints over rapidly while in this hardening bath and then wash them thoroughly before mounting. If prints were hardened before toning they will remain hard throughout all the manipulation. If they have not been previously hardened and become soft just before fixing, use a half ounce of solio hardener in the hypo; or immerse in an alum bath composed of 1 oz. alum to 60 ozs. water before fixing; afterward wash in two changes of fresh water, and fix as usual.

129. **Surface of Prints Softening in Wash Water After Fix-**

ing.—This is apt to occur if the wash waters are of a high temperature. Treat the prints just as you would if they had softened in the fixing bath, or during the preliminary washing.

130. **Prints Showing Red Streaks or Spots.**—Red spots are generally caused by finger marks or grease in the wash waters. Never use water from cooking utensils, as there is more or less grease in all kitchens. We have known cases where it was necessary to use hot water to take the extreme chill from the washing waters in winter. As this hot water was taken from a kitchen boiler, the resulting prints had red stains which we found upon examination were caused by grease in the hot water.

131. **Streaks.**—Are generally caused by allowing the prints to stick together while washing—not handling them over often enough. In other words, careless preliminary washings.

132. **Streaks on Prints After Fixing Which Did Not Show When Toning.**—These are generally caused by careless handling of the prints after fixing; allowing them to mat together in the first wash waters after fixing. Prints must be picked over and over thoroughly, handled in every change of water after fixing as well as before toning, and *should never be allowed to lag in any department, but be kept moving from the time they enter the first wash water until final mounting and drying.*

Difficulties—Collodion Prints.

133. **Edges of Print Cracking.**—This is due to the prints curling because they were not perfectly flattened in the first wash water. Be careful that you do not use more water than is absolutely necessary to cover the prints in the first washing. Flatten the prints to the bottom of the tray. Set the tray on end, allowing it to stand for five minutes, when the prints will be perfectly flat and will not break in future handling. Extreme cold water will cause prints to curl even after flattening, and constant handling when in this condition will induce cracking. Always keep the temperature of all baths and wash waters uniform.

134. **Paper Sticking to Negatives.**—If the paper is damp the tendency is for it to stick to the negative when printing. In some cases, where the paper is extremely fresh, it will adhere to the negatives; or if the negatives are extremely hard and contrasty, and are printed in hot sun, the paper will stick. If any of these difficulties are met with, brush the negative with French chalk before printing. Never blow the chalk from a plate, for if any

saliva touches the gelatin surface it will cause the paper to stick fast.

135. **White Spots.**—These are generally caused by insufficient handling in the hypo bath, or by not thoroughly washing after fixing. The prints must be handled over in the final wash waters and not allowed to mat together.

136. White spots are also caused when the prints dry very slowly, or when placed upon poor quality of blotters or paper when drying. If there is any undissolved hypo in the fixing bath and the crystals come in contact with the surface of the print, small white or yellow spots will result.

137. **Red Spots.**—The most common causes of red spots are unclean trays, finger marks, air-bells, and insufficient preliminary washing. If from finger marks, they will be easily recognized by the grain of the fingers. If the spots are uneven and scattered over the paper, or if the prints have the appearance of being greasy when they are in the wash water, the difficulty comes from oil or grease either on the hands, trays or in the water. This trouble may be readily overcome by adding to the second preliminary wash water 1 ounce of saturated solution of carbonate of soda to each gallon of water. The prints should be handled over in this water for 5 minutes. The alkali will cut off all grease or oil, and also neutralize the acid preservative chemicals in the paper. The remaining preliminary changes of water will wash out all trace of this alkali, the prints then being in a neutral condition when entering the gold bath.

CHAPTER VII.

Printing and Toning Matte Surface Papers.

Brief General Instruction.

138. **Introduction.**—The majority of matte surface printing-out papers are coated with collodion. The general treatment of the manipulation of this class of papers is similar to the glossy surface papers, but the printing is carried deeper into the emulsion instead of simply on the surface. While in many respects the manipulation is similar to that of glossy papers, yet as each operation differs slightly, exactly the same methods of procedure cannot be employed. The previous instructions on the manipulation of glossy papers will materially aid you in handling matte surface papers. In order to obtain black or carbon effects it is necessary to tone in two baths and because of this double toning, the printing, washing and toning in the gold bath are somewhat different from the instruction given in the preceding chapters.

139. **Printing Quality of Negative for Matte Prints.**—The negative having the proper printing quality for this class of paper should be clean, clear, soft and brilliant, and above all have pluck and roundness. A fully timed correctly developed negative, will enable you to produce a perfect print on almost any class of paper. We have found that many negatives are spoiled by not being developed far enough, many thinking that a half-developed plate is meant

when a soft negative is spoken of. The negative must be developed far enough to have body and strength, in order to hold roundness and brilliancy under the printing light. If the negative is developed so thin that the arch of the highlight has not strength enough to hold up under the printing light, you will never be able to produce anything but a flat, disappointing print, on any kind of paper. A good printing negative is not always beautiful to look at, but will produce perfect prints. Beautiful negatives often produce disappointing results, *i. e.*, prints that lack the solidity so essential for good printing quality.

140. There is a vast difference of opinion as to what constitutes a first-class negative, but all printers will agree that the best negatives are those which give the best results under the printing light. The beautiful catchy highlights on the drapery and face which appear in the negative must show in the print. The color of the negative has much to do with the final results; therefore, the producing of the right kind of a negative depends largely on the developing agent used in making it. The best negatives we have found to accomplish this result have been developed with pyro. While other developing agents produce beautiful negatives, they do not seem to supply the solidity necessary for the production of vigorous prints. For this reason we recommend pyro as a developing agent. The negative after all is only the means to the end, and if it does not accomplish that end it is not desirable.

141. **Printing.**—Matte surface papers should be printed until the highlights are well tinted. Pay no attention to the shadows, no matter how much they bronze. There is but little danger of over-printing, so do not be afraid of printing too deep.

142. **Washing.**—It is absolutely necessary to thoroughly wash the prints before they enter the first toning bath. Eight or ten changes, handling each print separately in every change of water, is generally sufficient to remove the preserving chemicals and free silver, and thus thoroughly prepare the print to enter the gold bath.

143. **Gold Toning Bath.**

STOCK SOLUTION NO. 1.

Chloride of Gold.....15 grs.
Pure Water.....15 ozs.

144. ACETATE STOCK SOLUTION NO. 2.

Acetate of Soda..... 4 ozs.
Pure Water.....10 ozs.

145. BORAX STOCK SOLUTION NO. 3.

Borax Crystals.....2 ozs.
Pure Hot Water.....6 ozs.

146. These three stock solutions are prepared in exactly the same manner described for the toning of glossy paper.

147. **Preparing the Gold Toning Bath.**—In a two-quart bottle place 40 ozs. of pure water and add to this 1½ ozs. of Stock Solution No. 2 (Acetate of Soda). This bath should be prepared 10 hours before use, if possible, in order to allow it to thoroughly ripen. If, however, it is impossible to wait that length of time before toning, it is permissible to place an unwashed proof print in the bath and permit it to stand for two hours. The free silver from the print has a tendency to hasten the ripening of the solution. As acetate of soda is a very weak alkali, it will have no effect upon the toning, unless the solution is allowed to stand at least two hours to ripen.

148. When ready to use the gold bath, pour the bath mixture into the toning tray. Then pour into a graduate ¾ oz. of the Stock Solution No. 1 (gold) and ½ drm. of the Stock Solution No. 3 (borax), allowing them to stand 5 minutes; then empty into the toning tray and add to the bath ½ teaspoonful of common table salt. Place a piece of red litmus paper in the bath, and cautiously add a little of Solution No. 3 (borax), carefully stirring the bath while adding. If the red litmus paper turns blue in two minutes enough of the borax solution has been added. Care must be exercised not to add more of the borax than

is absolutely necessary, but there must be enough alkali in the gold bath to at least turn the red litmus paper blue.

149. **Toning in the Gold Bath.**—The prints should tone in from 6 to 8 minutes and if they do not tone in this time, more gold solution should be added until the correct time of toning is reached. Do not make the bath too strong as the prints will tone before the whites clear up if there is too much acid action. If the prints bleach in the highlights before the shadows are toned far enough, add more of Solution No. 3 (borax) regardless of the color of the litmus paper, bearing in mind that the alkali acts as a restrainer on the highlights. The amount of alkali to use is the quantity necessary to keep the whites from bleaching while the shadows tone. An acid gold bath not only bleaches out the detail in the prints, but it also produces pink whites and weak shadows, and tones slowly. The color of the resulting picture is to a very great degree dependent upon the tone of the print when it leaves the gold bath. For the average matte surface paper the prints should be toned to a purple, but never a blue color. More direct instruction for toning in the gold bath will be found under the detailed instruction given in the following chapter.

150. Prints must be carefully handled over in 3 changes of clear water before placing in the platinum bath. This is essential, as none of the free gold which might be on the print should be carried to the platinum bath, as gold precipitates platinum and unless prints are well washed, platinum will be precipitated on the bottom of the tray and not on the print.

Phosphoric Acid Platinum Bath.

151. **Preparing the Stock Solution.**

Water	4 ozs.
Chloro-Platinite	15 grs.
Phosphoric Acid (50% Solution)	2½ drms.

Keep this solution in a well stoppered bottle and in a dark place.

152. **Preparing the Platinum Toning Bath.**

Water.....30 ozs.
Platinum Stock Solution.....6 drms.

It is advisable to prepare this bath at least one hour before toning.

Citric Acid Platinum Bath.

153. Citric acid may be substituted for phosphoric acid. Dissolve 8 ozs. of citric acid in 8 ozs. of hot water and place in a bottle labeled "Citric Acid Solution."

154. Prepare the Platinum Stock Solution as follows:

Chloro-Platinite .....15 grs.
Citric Acid Solution.....1 oz.
Water .....1 oz.

Shake until the platinite is thoroughly dissolved. For use take:

Water .....30 ozs.
Citric Acid Platinum Stock Solution.....2 drms.

155. **Toning in the Platinum Bath.**—When the prints are thoroughly washed and free of the alkali from the gold bath place them in the platinum bath a few at a time. It is advisable to test this bath with a single print in the same manner employed for testing the gold bath. Keep the prints in motion and leave in the platinum bath until all trace of red in the very deepest shadows has disappeared. Do not be afraid of toning too far in the platinum bath, as this is almost an impossibility. Detailed instruction for toning in the platinum bath is thoroughly covered in the following chapter.

156. **Washing the Prints After Toning in the Platinum Bath.**—Because the platinum bath is extremely acid and as it is absolutely necessary to remove all acid from the prints before placing them in the hypo bath, the prints must be thoroughly washed in not less than three changes of clear water before fixing. If acid were carried into the hypo bath,

sulphurization would at once take place and the whites become yellow.

157. **Fixing.**—Hypo baths containing alum, or other acid hardeners are dangerous, and should not be used as the acid releases the sulphur in the hypo and produces sulphurization in the prints, which will ruin them sooner or later. After prints are washed, fix in a *plain hypo* bath for 15 minutes. The bath should be composed of 64 ozs. of water, in which has been thoroughly dissolved 4 ozs. of hyposulphite of soda, or 18 hydrometer test.

158. **Salt Bath.**—After the prints are fixed, it is a good plan to transfer them at once to a salt bath, using 4 ozs. of common table salt to every gallon of water. Constantly separate the prints and leave them in this bath for five minutes.

159. **Final Washing.**—The prints should be thoroughly washed by hand, giving them not less than 12 changes of water, picking them over between each change. They can be washed in running water, but even then the same care should be given to continually handle the prints, picking up and separating them so that each and every print will be thoroughly washed. The permanency of the print depends largely upon freeing it from the hypo and other soluble chemicals which, if allowed to remain in the emulsion of the print, would, in time, cause a fading and deterioration of the image. If running water is used wash them for one hour. The safest plan however is to wash by hand.

Note.—Strong solutions of borax and acetate of soda are somewhat affected by change of temperature, and where any difficulty is experienced in their use, a 10% solution, or even a solution 1 to 16, should be substituted, using a larger quantity, which will give practically the same results as the stronger solution.

PORTRAIT

STUDY No. 8 — BY J. E. MOCK

OFF TOMPKINSVILLE, NEW YORK HARBOR

STUDY NO. 9 — BY DR. A. R. BENEDICT

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CHAPTER VIII.

Printing and Toning Matte Surface Papers.

Detailed Instruction.

160. **Depth of Printing.**—The printing quality of a negative has the same influence on matte papers as it has on glossy, *i. e.*, it is not necessary to print as deeply from strong, slow printing negatives as from thinner ones. The slower the reduction of silver the stronger and more solid will be the resulting print. When printing from a dense negative, the highlights are, of course, restrained from printing until the shadows have been exposed for a considerable length of time to the strong light. When the highlights are properly printed the shadows will be very dark and deeply printed and will not lose any of the strength in washing. A hard, contrasty, slow printing negative, therefore, should not be printed as deeply as a flat negative.

161. Owing to the extra toning bath, which serves as a bleaching process as well as for toning, the printing of *matte* papers must be *four or five shades deeper* than for glossy. A good rule to follow is to carry the printing until the highlights are slightly tinted and continue so long as the print grows stronger—more solid and brilliant. As soon as it begins to fog over, and becomes muddy looking—causing it to appear weaker—it is fully printed and can be removed from the negative. The highlights must always be tinted, but pay no attention to the shadows, even should they bronze considerably.

162. If in doubt, a good method to determine how

deep to print is to select a good well-timed negative and print it to the depth you judge is just right (from the above advice). Then make another print from the same negative, two shades darker. Wash and tone them together, and they will be excellent keys for judging future work. The right depth to which matte papers should be printed is probably the most important part of their handling. Although all the baths may be just right, if the printing is not deep enough the result will be a total failure. Beginners invariably under-print. Remember this and print deeply.

163. **Judging Print by Transmitted Light.**—There is another way to judge prints in printing and toning, but it is unsafe unless cautiously done. When examining prints, if they appear very nearly printed, step back from the window into the subdued light of the room and look through the print, with the face side toward you. This will show the print much lighter than by looking on the surface. When judging prints in this way be sure and do so in subdued light, for the prints will be flashed if examined in strong light.

164. When looking through the print, observe the highest lights (the whitest parts of the picture) and if they appear just the least bit stronger than desired in the finished print, they have been carried deep enough. You will find these prints, when viewed on the surface, look as though they were over printed, but they will, when washed and toned, make the most solid prints.

165. **Printing From a Soft Negative.**—A soft or quick printing negative prints only on the surface, unless it is exposed and printed in the shade, and even then it should be carried farther than a hard printing one, as prints from soft negatives lose strength in washing.

166. **Washing.**—Platino or matte surface prints should be washed in practically the same manner as glossy collodion, as platino is also collodion coated, but with a matte surface. Eight or ten changes, handling each print separately between each wash, is generally enough. It is, however, quite important that these waters be all of one

temperature. Never allow the fingers to touch the face of prints before they reach the first washing, otherwise you will experience difficulty with red spots. When you are ready to wash the prints, gather them face down on the cover of a regular paper box, as described in Chapter III, paragraph 48, Glossy Printing and Toning, and having provided a tray half filled with water, slide the prints into it, one at a time. It is a good plan to add an ounce of saturated solution of borax, or one-half ounce carbonate of soda solution, to every gallon of water used in the first wash water. This is done to neutralize the water. Should the water be alkaline in itself, this is unnecessary. After the first change of water which contains the alkali, wash in six to eight changes of clear water, or until you have eliminated the free silver and preserving chemicals. Unless these chemicals are properly removed from the prints they will not tone evenly.

167. **Washing Old and Fresh Paper.**—The paper when you receive it, if fresh, is in an acid condition from the chemicals used to preserve it. As the paper ages the preserving chemicals evaporate and weaken, and as the paper grows older, the amount of acid remaining in it is reduced considerably. Therefore, fresh paper containing much acid must be washed more thoroughly than if it was old. You must remove the acid and preserving chemicals from the paper before toning, as your gold bath is an alkaline solution and must be kept in this condition while toning all prints. Should you fail to remove all these acid properties from the print before they enter this bath, the acid would in time change the bath from alkali to acid, and the prints would not tone but would bleach.

168. **Flattening Matte Paper Prints.**—The chief success in working any and all collodion matte or gloss papers, without curling or breaking at the edges, lies in the proper flattening of the prints, and this is a very simple matter, but must be carefully done. Always use a good sized, smooth bottom tray for flattening the prints. Pour water into this tray to the depth of about one-half inch. Place

your prints, one at a time, into the water by sliding them in, one on top of another, keeping them flat on the bottom. Be sure that each print is thoroughly wet before another is placed on top of it. The prints must not be placed in a regular pile in the tray, as this would allow the edges to curl over each other, but should be piled irregularly over the entire bottom of the tray, partially over-lapping one another. After all the prints are in, pour off the water and with your hand squeegee and flatten the prints to the bottom of the tray. (See Illus. No. 5, Page 47.) Now add more fresh water and rock the tray for about five minutes, but do not pick the prints over. By adding this water and rocking the tray you will avoid red streaks. Pour off the water and again press down the prints with the flat of your hand. Set the tray on edge and allow the water to drain from the tray for about five minutes. Next pour plenty of water over the prints and proceed to wash by separating and picking them over and over. After flattening, prints may be handled face up. This will be found a distinct advantage, as the fingers will slip easily under the edges of the print, avoiding abrasion of the edges and also preventing rubbing the surface of the print.

169. **Temperature of the Water.**—The temperature of the water has much to do with the curling of the paper. In water too cold prints will curl readily. The proper temperature is about 65 or 70 degrees. During warm weather it is safe to use the water at regular tap temperature. In cold weather the chill should be taken off by adding warm water.

170. Another method of flattening, which has been recommended for large prints especially, and one we have found to work very satisfactorily, is as follows: Use two trays. One tray, after careful rinsing and while still wet, stand on end, filling the other tray one-third full of water. Immerse the prints in the water in the regular way and transfer them, face down, to the bottom of the tray standing on edge, being careful to flatten out each print. This keeps the prints in a perfectly flat condition. Splash a little

water over them occasionally and allow to stand for five minutes, after which they will lay perfectly flat and can be washed in the usual manner.

171. **Trays.**—Poor trays are really expensive things to have, as they cause loss of many dollars worth of time and stock. For that reason, good clean trays, free from iron rust, should always be employed. Rubber trays give the best all-around service. An inexpensive tray can be constructed by simply making a box of wood and covering it with heavy oilcloth. As the oilcloth becomes worn replace it with new covering. All trays should be thoroughly cleansed, before using, by scouring with bicarbonate of soda, or common salt which has been moistened, finally rinsing well in clean water.

172. The gold bath trays should not be used for the platinum bath, nor should the tray used for washing prints after the hypo be used for washing prints before the gold bath. Never allow the hypo tray to come in contact with the other trays but keep it at some distance from them.

173. **Toning in the Gold Bath.**—Taking for granted that the toning bath has been prepared according to the previous instruction, it is necessary to test it and ascertain whether or not it is perfectly balanced and in proper condition to give the best results.

174. Place a print in the toning solution, and spray the solution over the print with the right hand, watching it carefully. If the highlights and shadows tone equally, you will know your bath is working properly. Should the highlights tone chalky, bleaching—eating away as it were—and the shadows refuse to tone, this at once indicates that the bath is still too acid, and it is therefore necessary to add a few drops of borax to it. A fresh print should be placed in the bath, and if the bleaching continues, add a few more drops of borax. Continue adding, very cautiously however, until bleaching ceases and the test print tones down to a rich purple. The borax being a strong alkali must be added very carefully, or muddy whites will be the result.

175. Should the print tone this far and appear good and clear in the whites—not bleached nor muddy—your bath is at the right stage and you can proceed with the rest of the prints. It is advisable to always judge the prints by looking through them to the light. In this way you can judge more correctly when they are fully toned. Tone down to rich purple, and have bath strong enough to do this in about six to eight minutes. After toning place the prints into a tray of clear water until all are toned.

176. If your test prints show that the bath is toning too fast add more water, which will reduce the speed. On the contrary, should you find that the bath is working slow, add a little more gold. The gold, however, should always be neutralized before adding to the bath. To do this pour the gold into a graduate and add sufficient alkali until it turns red litmus paper blue. If you add gold, which is acid, to the bath without neutralizing, it may throw it out of balance. Sometimes it causes the bath to bleach, or produces pink whites in the platinum bath. Where large batches are being toned the bath will become worked out before all the prints are carried through. When the prints lag in the toning bath and do not tone in a reasonable time, fresh neutralized gold must be added to keep the bath working at a certain speed.

177. Proceed with the toning in exactly the same manner as with glossy paper; the only attention the bath will need is to keep it properly balanced. Never have more prints in the bath than you can readily handle. They should never be allowed to lay in the bath but must be picked over and over, or uneven tones will result.

178. **Quality of Tone.**—The final tone produced in the platinum toning bath is almost entirely governed by the depth of toning in the gold bath. If only the whites are clear in the gold bath, the resulting tones in the platinum bath will be strongly olive. If prints are toned to a chocolate brown, they will make beautiful olive tones. Prints toned to a purple with the deeper shadows a slight cherry color in

the gold bath, will produce a good black and white tone in the platinum bath.

179. *Remember*, prints from a strong negative will stand vigorous toning; weak prints require gentle toning. Therefore, strong prints may be toned faster and in a stronger bath than prints from a weak negative.

180. If the prints are carried too far in the gold bath there is little or nothing left for the platinum bath to do, and the print instead of toning to a black olive or black and white tone, will turn brown, oftentimes producing a disagreeable, muddy effect.

181. **Action of Salt in Toning Bath.**—Salt is added to the gold bath for the purpose of acting on the free silver which is still in the print. This will precipitate the free silver of the print which is left from the washing. It is almost impossible to wash the prints with the same result every day, the age of the paper, temperature of the water, and quantity of prints changing every time a toning is made. This being the case, you will find more or less free silver when the prints go into the gold bath. The free silver takes up part of the gold deposited. If the prints are put in the hypo bath in this condition the tones will change, as you have only a surface tone and it oftentimes gives much warmer effects than you had produced with the gold bath. But with salt in the gold bath, the free silver is precipitated and when the gold deposits, it will be on a permanent base and give you a tone that will hold.

182. The true tone of the print is the tone as it appears when examined by transmitted light—looking through it—and the same tone should appear on the surface of the print. The salt in the gold bath will assist in producing this result. It will also give you rich strong shadows, save the detail and the half-tones, and also aid the action of the gold.

183. Salt, however, should be used with care and judgment, as too much is apt to flatten the tone of the prints, and too little will have practically no effect. If an extreme quantity of salt were used it would also pre-

cipitate the gold and the prints would refuse to tone. Lack of salt in the gold bath will often cause uneven toning.

184. Gold is added to the bath for the purpose of toning the print, or changing it from red to any tone desired down to the blue, and the amount of gold in a bath regulates its speed, other conditions being correct. A formula may call for one dram or two or three grains, but the only true test of the amount to use is by testing for speed with a print when the bath is made.

185. A gold bath should have a speed of five to eight minutes. If not fast enough, add more gold to increase the speed. If the test print shows the bath toning too fast, add more water, which will reduce the speed. Should you find, during toning, that the bath is working too slowly, the number of prints already toned having used up the gold, more gold should be added. Always neutralize the gold before adding to the bath, by putting the gold into a graduate and adding an alkali until it turns red litmus paper blue. If you add acid gold to a bath without neutralizing it may throw it out of balance, sometimes causing the bath to bleach matte papers, producing pink whites in the platinum bath.

186. **Alkalies.**—The alkalies used in the different gold baths recommended are: borax, carbonate of soda, and bicarbonate of soda. Carbonate of soda is a very strong alkali and should be used carefully. It is used for warm tones in the gold, resulting in olive tones in the platinum bath.

187. Bicarbonate of Soda is used for purple or blue tones. For toning prints in a bath, in which this alkali is employed, care should be exercised not to tone too far, unless you desire a blue black result.

188. Borax is the most universally used alkali, there being less danger of using too much of it and injuring the bath. Borax gives brown tones in the gold bath, and a rich olive-black tone in the platinum bath. Alkali is used in the gold bath for the purpose of precipitating the gold and to act as a restrainer on the highlights, holding

them from over-toning and bleaching while the shadows are toning to the desired color. A formula may specify a certain amount to use, or direct that alkali be used until red litmus paper turns blue, in a given time. These directions given for the use of alkali in a gold bath formula can only be employed as a general guide, as each lot of prints may require a different quantity; a fresh bath, or fresh paper, for instance, requiring more alkali than a ripened bath or old paper. The only true test of how much alkali a bath requires is its action on the prints you are toning. If you bear in mind that the alkali in the gold bath acts as a restrainer on the highlights and prevents their bleaching, while the shadows are toning to the point desired, you will know that the proper amount to use is the amount necessary to accomplish this result. It is not a question of whether it be a drop, an ounce, or whether the red litmus paper turns in five minutes, or at once; it is the result you must look for and not the time in which it is produced.

189. Most of the trouble in toning in gold baths comes from improper use of the alkali. To illustrate this point, suppose we are making up and testing a gold bath. First, be certain that your trays are perfectly clean. Having a few prints washed ready for toning, pour the toning bath, which you have previously prepared, into the tray. Place a piece of red litmus paper in the bath and add the alkali. We will use borax in this case. Add sufficient to cause red litmus paper to turn blue in a minute or two. For your first experiment select a print showing white drapery. Place it in the bath and watch it closely. If the white tones clear up at once, before the shadows tone to the point desired, add more borax. Pay no attention to the litmus paper after this point and try another print. If the same effect shows add more alkali and try another. Keep on testing the bath with a print and adding alkali until the bath is so balanced that when the shadows are toned the highlights will be thoroughly clear, without bleaching, or the loss of any detail the print possessed when

it came from the printing frame. When the shadows become perfectly clear your print is completely toned.

190. Should you find in toning that your prints refuse to clear in the highlights, the trouble is probably caused by the bath containing too much alkali or from impurities in the water. If caused by too much alkali add to the bath a little acid gold or a few drops of citric acid. If from impurities in the water, distilled or ice water should be used.

191. **Acetate of Soda.**—Acetate of soda is a very weak alkali, almost a neutral chemical. The fact of its being one of the mildest alkalies permits us to use it in large quantities. As strong alkalies give us muddy whites when using them as restrainers, we, therefore, use acetate of soda in large quantities, and while its alkaline properties are mild, its retarding qualities are powerful; but acetate of soda has no beneficial effect upon a gold bath, unless, after adding acetate, the bath is allowed to stand for at least two hours to ripen.

192. **Lack of Alkali in the Gold Bath** will give weak shadows, pink whites, blue half-tones and bleached prints. If you do not get strong, rich shadows in the print from the gold bath, you cannot get them in the platinum bath. Insufficient toning in the gold bath, leaving the shadows a bricky red, will give flat prints, lack of brilliancy, yellow whites and muddy shadows, resulting in a brownish olive tone. This, in connection with lack of proper amount of alkali, is the cause of the majority of troubles in the gold bath. A gold bath should be made up from four to twenty-four hours before using. An excellent plan is to make up a fresh bath after you have finished toning, for use the next time, adding only enough gold to ripen the bath, say one grain, and a few drops of the alkali. Some printers put a print into the bath just as it comes from the frame, which furnishes enough silver to ripen it. When ready to tone, add gold and the proper amount of alkali to make speed of bath from five to eight minutes. A ripened bath will work much more smoothly than a fresh one. When

acetate of soda is used in a gold bath, it is for the purpose of holding the strength and brilliancy of the tone.

193. When the water used is extremely alkaline it is best to use the gold alone without neutralizing, thus first acidifying the toning bath; then just before toning add the borax to make the bath alkaline. The reason for this is that the alkali found in the water is not of the proper kind and will give poor results.

194. **The temperature** of the toning bath should be between 65 degrees and 75 degrees Fahr.

195. **How to Tone Different Kinds of Prints.**—Vigorous prints will stand vigorous toning. Weak prints require gentle toning. If prints tone too rapidly the bath is too strong in gold, and can be corrected by adding more water. Uneven toning comes from insufficient washing before gold bath; gold too strong; lack of alkali; bath being too warm; prints sticking together in the bath; insufficient bath; not keeping prints moving; also from insufficient salt in gold bath. If prints tone too slowly the bath may be too weak in gold, or it may be contaminated with foreign impurities, or be too cold. In the gold bath flat-looking prints may be caused by the use of too much salt, too much alkali, or by impurities in the water. When from impurities in the water, a few drops of nitro-muriatic acid (nitric acid one part, muriatic acid two parts) is added to acidify the toning bath and then the proper alkali employed, this difficulty may be overcome.

196. **Washing after Toning in Gold Bath.**—As the prints become toned place them in a tray of fresh water, using plenty of solution. As you proceed with the toning, occasionally pick over the prints in this tray of fresh water. After the entire batch is toned it is absolutely necessary that they should receive a thorough washing to remove all the excess alkali from the prints. The gold bath being alkaline, there will be considerable of this alkali carried into the first wash water.

197. Give the prints three changes of fresh water, thus eliminating all the excess alkali, when they are ready for

the platinum bath. If the prints were placed in the platinum bath in an alkaline condition they would very soon fill the bath with alkali, consequently causing the platinum to precipitate. In a short time all the platinum precipitated in the form of a sediment would settle on the bottom of the tray, and the prints would refuse to tone even if more platinum is added. Should you be successful, however, in forcing a tone in this bath by using a strong platinum solution, the result would probably be yellow, muddy prints when mounted, as they will surely show up sooner or later. After freeing prints from excess alkali they are ready for the platinum bath, which should be prepared at least one hour previous to using.

198. **Toning in the Platinum Bath.**—When the prints first go into this bath the highlights become muddy, but within a short time they commence to clear. Prints must remain in the bath until the whites are thoroughly cleared and every trace of red and brown is removed in the deepest shadows. Do not fear leaving the prints in the platinum bath until the desired color and richness you desire is obtained.

199. A slow working platinum bath gives olive tones and flattens the whites, while a quick platinum bath gives black tones. A slow bath has a tendency to cause the shadows to become muddy. In cold weather heat the platinum bath to 70 degrees; in fact for the best of results at any time, the temperature of this bath should never be much below 70 degrees Fahr. Vigorous prints will stand vigorous toning in a strong platinum bath. Weaker prints require gentle or slower toning. Slow toning is often caused by not using the proper kind of phosphoric acid. Purchase phosphoric acid in small quantities (ask for 50% phosphoric acid), and keep bottle tightly corked. Slow toning is also very often caused by the water being very alkaline, as alkaline water will precipitate the platinum.

200. **Washing Prints After Toning in Platinum Bath.**—As fast as the prints become toned transfer them to a tray of fresh water, and as you proceed with your toning

occasionally separate the prints in the fresh water so that they do not become matted together, until all the prints are toned. After all the prints are toned, it is important that they receive a thorough washing before being placed in the fixing bath. The chemical action of the platinum bath must be acid, or it will not tone, therefore, the prints coming from it will naturally be in an acid state. For this reason, it is absolutely necessary to wash the acid out of the prints. If this is not done, acid will be carried into the hypo, producing sulphurization and yellow whites.

201. The prints should have at least three changes of water before fixing, and between each change must be thoroughly picked over and over, to insure against the possible chance of any of them sticking together, and to thoroughly eliminate all of the acid from the prints before they enter the hypo bath.

202. **Fixing the Prints.**—It is advisable to prepare the hypo bath by hydrometer test, making it 18 grs. strong. The hypo should also be slightly alkaline and be tested with blue and red litmus paper. If the red litmus paper turns blue the bath is, of course, alkaline, but, if blue litmus paper turns red it will be necessary to add a few drops of saturated solution of carbonate of soda or borax until the red litmus paper turns blue. This bath can be used in any quantity but it is advisable to use plenty of solution in order that the prints may be more easily handled and moved about, thus insuring thorough fixing. Should more or less bath be used, always be careful that the proportions remain the same.

203. Where large batches of prints are toned there is danger of carrying some of the prints a little farther, or under toning them in the gold bath, the result being that when they come from the platinum bath a difference is noticable in tone. As some will be warmer than others, before fixing, in order to equalize the tone, place them in a sulphite of soda bath as follows: To 60 oz. water add ½ oz. saturated solution sulphite of soda. This will darken the tone somewhat, imparting to all prints a uniform color.

Prints should be placed in this bath a dozen at a time, handled over for half a minute and then put directly into the fixing bath, always picking them over and over, face down. Handle them exactly as other prints are treated during fixing. Allow them to remain in the bath for 15 minutes, keeping them in motion until fixed.

204. **Using Baths More Than Once.**—The gold bath should be saved and the clear liquid used for your next toning. The platinum bath can also be used over. As the platinum bath is extremely acid, never use more than one-third new to one-half old bath. If you were to use the entire old bath the platinum would be exhausted, the acid still remaining in it. By adding fresh platinum solution to the old bath, the proportion of acid would become too great and there would be danger of cutting out the high-lights of your prints. For this reason, use only a part of the old bath. One-third old with two-thirds fresh bath added, makes richer tones than a fresh bath, and obviates all danger of bleaching the prints. Toning too slowly in the platinum flattens the whites and tends to cause muddy shadows.

205. **Final Washing.**—After the prints come from the hypo and have been placed in the salt bath for 5 minutes (4 ozs. of salt to 1 gal. of water, as mentioned in the general instructions given in the preceding chapter), they should be thoroughly washed by hand in at least three changes of water, in order to keep the prints constantly separated before placing them in running water, or in a washing tank. By doing this the surface hypo will be washed off and small air bubbles removed. These air bubbles sometimes fasten themselves on the prints and hold the hypo under them, which permits the hypo to bleach, causing small white spots to show on the prints when they come from the wash water. After washing the prints by hand in two changes of water, one hour in running water will be sufficient additional washing, providing the prints are thoroughly separated every five minutes. Ten to twelve changes by hand, however, will prove far better.

When washed by hand the prints should remain in each water about 5 minutes and also be separated several times in each change of water.

206. **Caution.**—Long soaking in the bath and wash waters very materially affects the brilliancy of the prints. Because of this, one cannot be too particular about the speed of various baths, and the constant handling of prints in the different wash waters to thoroughly remove chemicals which might tend to retard the action of subsequent baths, or to endanger the permanency of the resulting print.

207. **Practice Work.**—The manipulation of platino or any matte surface printing-out paper is exceedingly interesting, for with this product, more than any other, you can retain and reproduce accurately, every quality in the negative. As no product will give more beautiful half tones than this paper, the manipulation of it becomes most interesting and fascinating, as a great variety of effects may be obtained with proper handling. As matte prints require much deeper printing, most failures lie in this department. Therefore, for your practice work, make several prints from different negatives. Number each print before toning and mark them in some way so you will know the depth to which each particular print was printed, remembering that with soft negatives you carry the printing farther than for strong ones. In the toning observe the action of the gold bath on the first print. *When the print first enters, does it tone smoothly, or does it bleach?* Note this data on the back of the print. If the bath is altered in any way, note the action of the second test print. Use a soft pencil when writing remarks on the back of the prints. It is well to abbreviate as much as possible, making only necessary notes while prints are wet. *Never use an indelible pencil for this work.*

208. After the gold bath is working properly, note the color of the different prints toned in this bath. This is important, as the final color of prints is controlled in the gold bath. Observe the speed of the gold bath. Next,

watch the action of the platinum bath. It is a good plan to remove some of the prints from the gold bath at different stages of color, that is, tone some deeper than others. Observe the effect of each in the platinum bath. When all are toned you will, undoubtedly, have a variety of colors. Do not allow this to discourage you, however, as here is where you gain experience.

209. Before fixing, note on a sheet of paper, or memorandum book, the number of each test print that you have toned. Make a record of the appearance of each print in the printing, how it acted in the gold bath, and the color of the print when removed from the gold bath and the color of the print when it came from the platinum bath. Make such notes as described above on several of your most important test prints. This data will prove vitally important for future reference. Next, before placing prints in the hypo, run them through the sulphite of soda bath as instructed. In this bath will be found the means to cover a multitude of failures. Prints in this bath will all darken and become one color; so they will enter the fixing bath at an even tone, the results being uniform prints. Some of the prints, however, will be more brilliant than others, but with notes attached to the test prints, and filed in the proof file, you will have most excellent data for future guidance.

Note.—In localities where very alkaline water is used some difficulty may be experienced in obtaining brilliant prints by using part old and part fresh toning bath. Under such conditions it would be advisable to prepare a fresh bath for each batch of prints, allowing the bath to stand for a few hours, to ripen, before using.

CHAPTER IX.

Part I.

Toning With Aristo Gold and Platinum Solutions.

210. The preceding instruction is applicable to all classes of matte papers and excellent results will be secured if the directions are carefully followed. The American Aristotype Company supply gold and platinum in liquid form ready for use, but in order to facilitate the use of these solutions, the following formula should be used when working with these particular chemicals.

211. GOLD BATH.

Water.....64 ozs.
Salt.....30 grs.
Acetate of Soda (Saturated Solution).....½ oz.
Aristo Gold, No. 2.....2 drs.
Borax enough to turn red litmus paper blue in one minute.

212. The gold toning bath should be made up from 10 to 12 hours before using. Add enough gold to keep speed of bath 6 to 8 minutes. Do not make the bath too strong, as the print will tone before the whites clear up. The manner of testing the bath and the methods of toning are identical with the preceding instruction.

213. PLATINUM BATH.

Water.....60 ozs.
Aristo Platinum.....3 to 5 drms.
Add platinum enough to keep the speed of the bath from 6 to 8 minutes.

214. The formula gives 60 ounces of water and three to five drams platinum solution. Of course, it depends on

how many prints there are to tone. The best method to follow will be to place enough water in the platinum toning tray adding about three drams of platinum solution at the beginning. The speed of this bath should be from six to eight minutes. If necessary, add more platinum until you get the speed, as it is platinum and not water that tones.

215. A print slightly toned in the gold bath will take more time and more platinum to tone in the platinum bath. If a print is left very warm in color in the gold bath and toned very far in a strong platinum bath, it will take on a strong olive tint, as overtoning with platinum gives greenish or olive-black tones. If you tone to a purple and deposit plenty of gold on the print, it takes less platinum and time to tone, and the result is a pure black.

216. After the prints have been toned in this platinum bath according to the preceding general instructions for platinum toning, they should be thoroughly washed and fixed in the fixing bath previously recommended and afterward handled over and over in this bath for 20 minutes. They should be washed by hand through not less than 12 changes of water for a period of one hour. Aristo Platino and Aristo Jr. can be washed and toned together in the same gold bath.

217. A BORAX GOLD BATH.

Water.....64 ozs.
Salt.....30 grs.
Aristo Gold No. 2.....2 drms.

Sufficient borax (saturated solution) to turn red litmus paper blue in two minutes.

218. ANOTHER GOLD BATH.

Water.....60 ozs.
Salt.....30 grs.
Acetate of Soda (Sat. Sol.).....½ oz.
Aristo Gold No. 2.....1 drm.

Place in the bath a cabinet size piece of platino paper and allow to stand over night.

219. When ready to tone add one dram Aristo Gold No. 2 which ought to make the speed of the bath six or eight minutes. Make the bath alkaline by adding enough of the saturated solution of borax to cause *fresh* red litmus paper to turn blue in two minutes.

220. **Note 1.**—A good many photographers omit the acetate of soda from the gold bath, claiming just as good results. Whether or not it is best to use acetate of soda depends a great deal on the condition of the water—a matter which every photographer should decide for himself.

221. **Note 2.**—The crystal form of acetate of soda is used by many, instead of the saturated solution, the claim being made that the latter loses its strength. One-half ounce of the saturated solution of acetate of soda is equivalent to eighty grains of the crystals.

222. **Note 3.**—In some sections it is found advisable to add salt to the third wash, as it helps in eliminating the free silver, insuring more even toning in the gold bath.

223. **Carbon-Platino.**—It is generally conceded that the Carbon-Platino print is the nearest approach to the true carbon of any photographic production. The Carbon-Platino is simply a print on Aristo Platino backed up with platino backing paper. The squeegeeing of the print, necessary in backing up, gives to it a beautiful velvety carbon surface. Carbon-Platinos are usually printed with a narrow white margin and mounted on pliable card stock by tacking the upper edge with glue, leaving the rest of the print free from the mount. To make the glue stick to the collodion back of the print roughen the surface with fine sandpaper. To make Carbon-Platino prints, back up Aristo Platino prints as hereafter directed.

Part II.

Backing Prints.

224. **Backing Aristo Platino, or any Matte Paper.**—The object of backing these prints is to make the finished

prints lie perfectly flat. This backing paper is made upon the same raw stock, coated with the same collodion emulsion, excepting that it contains no silver and is therefore not sensitive to the light. When prints are backed while drying, the back will draw the same as the face of the picture and the print, therefore, cannot curl or cockle.

225. **Directions for Backing.**—After the prints have been finally washed, place them one by one, face down on a piece of clean glass and squeegee the excess water from them. On another glass, place the backing paper (which has been previously soaked in water) face down, mop off the surplus water and apply the paste. Mount this backing paper over the print on the glass, being careful to rub it down smoothly from the center toward the margin. The backing paper should be at least one-half inch larger than the print, so when it is mounted over the print on the glass it will leave a margin of one-fourth inch all around the print. This margin of backing paper will adhere directly to the glass, thus holding the print in perfect contact with the glass until it is bone dry. With a sharp knife the print may be cut from the glass and trimmed. The margin of backing paper which remains on the glass may be readily removed with hot water, and the glass made ready for another print.

226. Each glass may be made to do double service by mounting on both sides. First squeegee a wet print on one side of the glass, turn it over and lay on a clean blotter and squeegee a print on the other side. Mount the backing paper over this print; then turn the glass over and mount the backing paper over the print on the other side, placing the glass in a rack to dry. If small prints are made, for instance cabinet size, a dozen or more prints may be squeegeed to one glass. Take a 14x17 glass, perfectly clean on both sides. Place six cabinet prints on one side close together, being careful not to allow any one print to overlap another. Next take a dry blotter full size of glass and lay it over the prints and squeegee in contact; then turn the glass over, laying on a clean blotter, and squeegee six

more prints on the other side in exactly the same manner. Then mount a piece of backing paper 12x13 inches in size, over the six prints. This will allow at least one-half inch of margin of backing paper to adhere to the glass around the edges of the prints. Then turn the glass over again and mount a piece of backing paper over the other six prints, and place the glass with the twelve prints mounted on it in a rack to dry.

227. **Caution.**—In preparing the backing paper it must be understood that the emulsion on this paper contains preserving chemicals which it is necessary to remove before using. The paper should, therefore, be washed in four changes of water—about five minutes to each change. To the second wash water add one ounce of saturated solution of carbonate of soda to every gallon of water used. Then in order to have this paper as thoroughly wet as the prints are when they are squeegeed to the backing paper, it should be allowed to soak during the toning and washing of the prints.

228. In cutting the backing paper care should be taken to see that the grain of the paper in backing runs the same way in the sheets as the grain of the paper in the print. This you can ascertain by cutting off a piece, say two or three inches, and placing in a tray of water. If it curls up at the side, the grain runs the wrong way; if it curls up at the end, the grain runs crosswise. Always see that the prints and the backing curl in the same way of the sheet. This is necessary in order to insure the prints lying flat, but if the grain of the backing paper does not run the same as the grain in the print the finished print would curl slightly.

229. All surplus water on the margin of the glass around the edges of the prints must be carefully absorbed with a blotter before mounting the backing paper to it. A drop of water carelessly left on the glass would interfere with the adhesion and cause the prints to cockle at that point. Prints should be allowed to dry slowly at first until the paste is thoroughly set, or until they are about half dry;

then the drying may be hastened by artificial heat. If you find any trouble with the prints sticking to the glass—this may happen when mounting six prints at a time—take a piece of pure castile soap and swish it through the water a few times until the water feels somewhat slippery, or smooth to touch. Place the prints in this soapy water just before you are going to place them on the glass. Prints treated in this way will readily come from the squeegee glass.

230. **Practice Work.**—Toning with Aristo gold and platinum prepared solutions is performed in exactly the same manner as where you prepare your own stock solution. However, for practice work follow the same method as given in the previous instruction for printing and toning matte surface papers, making notes accordingly and filing the test prints in your proof file. Always date each print and note the bath used.

231. Platino prints when backed will always lay flat and it is advisable that they be printed with a margin. At any rate they should be glazed on glass, and when so glazed the finished print gives a very smooth, even texture, the exact quality of the negative being truly reproduced in the print.

YOKOHAMA HARBOR

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STUDY NO. 10 BY WM. H. PHILLIPS

PORTRAIT

STUDY NO. 11

BY RUDOLF EICKEMEYER

CHAPTER X.

Varying Water Conditions.

Their Effects Upon the Manipulation of Sensitized Papers.

232. Varying water conditions have considerable to do with the manipulation of printing-out papers. Generally in the spring and fall of the year all printers experience more or less trouble, and in many instances blame is placed on the paper. Occasionally, this is the true cause. However, in the majority of cases the trouble lies in the water used. Water containing vegetable matter, or that which is very much alkaline will cause all kinds of trouble. You will notice that after a heavy fall of rain the water is impregnated with vegetable matter, generally testing quite alkaline. There are instances where even this alkali does not interfere with the toning and the baths seem to tone quite well, yet the prints after mounting dry up brown and yellow.

233. Usually when you are experiencing the most trouble with muddy prints they will tone exceedingly fine in the gold bath, but refuse to tone in the platinum. This is easily accounted for. It is positive proof of very alkaline water, and prints should be handled under such circumstances in exactly the same manner as you find necessary when using very alkaline water. Under such conditions wash the prints in the regular way, but use no added alkali in first nor succeeding washings, for the reason that the water is already alkaline. After the gold toning, wash prints through a citric acid bath of say 10 to 20 drops saturated

solution of citric acid to each gallon of water. The acid is used to counteract the excess alkali. Finally wash in two changes of plain water, which will remove all the excess acid and leave the prints neutral. They are then ready for the platinum bath.

234. Prints after leaving the gold bath, being decidedly alkaline and the water alkaline as well, it is impossible to remove all the excess alkali from the prints with this alkaline water. However, it must be done before the prints enter the platinum bath, which is an acid solution. The prints entering this platinum bath in an alkaline condition will soon fill it with alkali, causing the platinum to precipitate. In a short time all the platinum being precipitated to a sediment on the bottom of the tray, the prints would refuse to tone, even after more platinum was added. Should you be successful in forcing a tone in this bath by using a strong platinum solution, beware of yellow, muddy prints after mounting, as they will surely show up sooner or later. To avoid this trouble, whenever you find the platinum bath precipitated and refusing to tone, test your wash water with blue and red litmus paper to see if it is alkaline. If the red litmus paper turns blue almost instantly the water is strongly alkaline. In this case, treat your prints to the acid bath advised above, make up a new platinum bath and start anew, when you will find your path clear of difficulties.

235. After the prints have gone through the platinum solution and are in an acid condition, you must again eliminate the acid by washing in two changes of water, which brings the prints back to a neutral state, as they were at first. The wash water being alkaline, a few changes will do this. Prints must be neutral before being placed in the hypo bath. The first bath must be slightly alkaline, or, at least, neutral, *never acid*. Should prints enter the hypo bath in an acid condition they would be apt to bleach and give muddy whites.

236. **Difference Between Fresh and Old Paper.**—The paper when you receive it, if fresh, is in an acid condition, caused by the chemicals used to preserve it. In time

these chemicals evaporate and as the paper grows older the amount of acid remaining in it is reduced. Therefore, fresh paper containing more acid must be washed more thoroughly than if the paper was old. You must remove the acid and preserving chemicals from the paper before it will tone, as the gold toning bath is an alkaline solution and must be kept in this condition while toning all prints. If all these acid properties are not removed from the prints before entering this bath, the acid will change the bath from alkali to acid and the prints will not tone, but will bleach. Old or well-ripened paper, therefore, will give you less trouble than fresh paper. We therefore advise when purchasing fresh paper, that you place it in a dry place and allow it to ripen for say two weeks before using. As in very warm climates, or during extremely hot weather, the paper will ripen much more rapidly, one week's drying will be sufficient.

237. **Effects of Acid Water.**—Where water is used which tests acid, you will have sulphurization and faded prints, unless provision is made against it. Many failures can be accounted for by lack of judgment, or absence of knowledge as to what to do and when to do it. If you have carefully tested the water you are using and find it is all right, and if you have handled the paper in all its manipulations in accordance with the above instructions, the trouble is doubtless due to defective paper. In some localities photographers are troubled with faded and bleached prints, and upon investigation it has generally been found that the water used was slightly acid. To tone with such water will invariably give bleached prints unless properly treated.

238. We advise you always to test the water to be used before beginning to tone. Water that tests slightly alkaline, or water that will neither turn blue litmus paper red nor red *blue* in a few minutes—in other words, neutral water—is all right. Water that tests acid must be first neutralized before using. Be sure to remember that the preserving chemicals used in preparing paper are very

acid. This acid must be eliminated, but it cannot be done with acid water, no matter how thoroughly you wash the prints. Neutralize all wash water previous to gold toning, by adding to the first wash water ½ ounce of saturated solution of ordinary sal soda, or sufficient to turn red litmus paper blue in one minute, and to each following change of water add a little less. The last water use without alkali, as the prints are well saturated with it and the last washing will eliminate the excess alkali from the prints and place them in a neutral condition.

239. Prints entering the gold bath in an alkaline or neutral state will tone freely and evenly. After toning in the gold bath they can be placed in plain water without neutralizing it. As the next bath (platinum) is an acid solution, the prints can be in an acid or neutral state, but they must never be alkali when entering the platinum bath. For this reason be sure to wash the prints carefully in several changes of plain water after gold toning, in order to remove the excess of alkali obtained in the gold bath. The prints are then ready for the platinum bath, which will work nicely after this operation. Tone prints deep in this bath and after toning place them in plain water. If the previous wash water has proven to be acid this must also be neutralized with sal soda, and tested with litmus paper. The water now being neutral (and not acid) will check the toning and will also prepare the prints to enter the hypo bath.

240. After all prints are toned prepare your hypo bath in the regular way, being absolutely positive that it is alkaline. It must never be acid. If it is, neutralize by the addition of a few drops of carbonate of soda. Then fix the prints as usual. After fixing you can wash your prints in ordinary water. Even if the water is acid at this stage, it will do no harm.

241. A few facts should always be remembered: First, all wash waters must be neutral. Water but slightly alkaline will do no harm. Second, prints must be in an alkaline, or at least a neutral condition when entering the gold bath. Third, they must be in a neutral and not an alkaline condi-

tion when entering platinum bath, which is an acid solution. Fourth, they must again be washed into a neutral state—slightly alkaline will do no harm—before entering hypo bath. The latter must be alkaline. The condition of water for final washings is of no particular consequence.

242. **Treating Water Which is Strongly Alkaline or Acid.**—It is always advisable, in case you experience trouble in any manipulation, to first look to the water conditions and test thoroughly before investigating elsewhere for the trouble. If you find the water turns red litmus paper blue, even slightly, you will know that the water is alkaline and requires no altering. Should it test strongly alkali, you will require no additional alkali in the gold bath, and can dispense with Stock Solution No. 3 entirely; or at least, use less than the formula calls for. If, on the other hand, you find that the water turns the blue litmus paper red, you will know that the condition of the water is acid. At once take steps to neutralize it, by adding borax solution or carbonate of soda to the water until it neither turns the blue paper red, nor the red paper blue. It is a good plan to use boiled or distilled water in preparing all the chemicals and baths, especially the toning baths.

243. **Muddy and Impure Water.**—Many cities and sections of the country are continually troubled with "roily" and impure water. Some of these contain sulphates, chlorides, magnesium in different forms, sulphur, iron in various forms, and a large variety of vegetable substances, effects of which are visible especially in the winter and spring months. This difficulty can be overcome in an inexpensive manner.

244. **Purifying the Water.**—A simple and easy way to purify the water, so far as the impurities which affect the chemicals used in toning are concerned, is to get an empty whiskey or alcohol barrel. Remove the head; clean the barrel thoroughly; place the barrel on a shelf in a corner over your sink, at an elevation sufficient to enable you to draw the water from it. About six inches from the bottom of this barrel bore a hole and fit a faucet. Use a faucet

with a threaded screw for hose connection. The advantage of the hose connection is that it will enable you to carry the water to any tray. Fill the barrel with water. Dissolve a table-spoonful of powdered alum in a cup of hot water, and while stirring the water in the barrel gradually pour in the alum water. After a thorough mixing test the water with blue litmus paper. If the water tests acid, or in other words, turns blue litmus paper red, you will have added sufficient of the alum. Allow the water to stand in the barrel over night, or until you wish to use it. You will find the alum will clear the water very nicely and also settle the vegetable matter and other impurities. The sediment which will collect in the bottom of the barrel will do no harm if the barrel is cleansed at least twice a year. Every time you add water to the barrel apply the alum treatment in manner described. Only sufficient alum is required to make the water acid.

245. When using water from this barrel, it being in an acid state will make it necessary to neutralize it before use. This you can do by adding carbonate of soda or borax solution to each tray of water. Test the water by using red litmus paper. Add sufficient of the alkali to turn red litmus paper blue. Where a large quantity of water is used a barrel may be arranged to feed from the top and work automatically. As the water is drawn from the barrel it fills itself and shuts off when the barrel is filled. In this case place a pound of alum crystals in a linen sack and hang it in the barrel, and the water will take up enough of the alum to acidify the water and precipitate the vegetable matter which will collect at the bottom of the barrel. This barrel should be cleansed every few months, for unless this is done you will in time have a collection of mud in the bottom of the barrel, caused by the vegetable matter which the alum has precipitated.

246. It is very seldom that the above treatment of the water is necessary, and unless you are experiencing any difficulty it is needless to go to this trouble. Should you,

however, experience any difficulty of this kind, you will know how to treat it.

Water Tests.

247. **For Lime.**—Drop two drops of strong oxalic acid solution in a glass of water. If it turns the water milky, lime is present.

248. **For Alkalies.**—If red litmus paper is immersed in the water and allowed to remain one-half hour and does not change color, alkali is not present.

249. **For Carbonic Acid.**—Add an equal part of lime water. If carbonic acid is present, a precipitate is seen. Add muriatic acid and it will effervesce.

250. **For Iron.**—Boil nutgalls and add to the water. If iron is present it turns slate gray. Add a pinch of prussiate of potash; if it blues, iron is there.

251. **For Hard Water.**—Dissolve good soap in alcohol; drop a few drops in a glass of water. If the water becomes milky, the water is hard. If it remains clear, the water is soft.

Withdrawn

CHAPTER XI.

Difficulties—Printing and Toning Matte Surface Papers.

252. **Keeping the Trays Clean.**—Chemically unclean trays are the cause of a great deal of trouble to photographers. It is essential that each tray be kept for one particular purpose and used for that specific purpose only. It will pay a hundred times over to have a special tray for each part of the manipulation. For wash waters and hypo baths, wooden trays lined with oilcloth, or rubber cloth, are perfectly safe and can be constructed cheaply. Have plenty of them. In good plain letters mark one "First Washing," one "Gold Bath," one "Between Baths" (for washing between gold and platinum baths), one for "Hypo Bath" and one "After Hypo" (to be used after prints come from the hypo). The toning trays should be made of chemical-proof material, such as porcelain, or hard rubber. The number of trays before mentioned may at first seem unnecessary, but it is always best to be on the safe side, and as trays are inexpensive, it is advisable to have plenty of them, and each for a particular part of the manipulation. It will pay well in the end.

253. **Dusting Negatives.**—No difficulty will be experienced in keeping the negatives perfectly free from dust if the printing room, including work table and a shelf or other support used for printing, also the printing frames, are kept clean. It is extremely important that the printing room be kept as free from dust as possible. Carefully brush both frame and negative before placing the paper on the negative. This saves time in spotting prints.

254. **Judging Correct Depth in Printing.**—Difficulty will at first be experienced in securing the proper depth of printing, but if you bear in mind that it is necessary to make allowance in the printing for a certain amount of bleaching or eating away of the highlights, and print accordingly, no trouble will be experienced. The prints should be carefully examined and their appearance particularly noted before placing them in the first wash water. Notice carefully the changes as they take place in the toning baths, and fixing bath, then examine the prints carefully when dry. If

they are too dark or too light, variations in the next printing should be made accordingly. The printer who is able to print an entire order with little or no variation in the depth of printing, has mastered the secret of this branch of work. It is practice and only practice that will enable you to overcome this difficulty.

255. **Paper Sticking to Negatives.**—Sometimes when negatives go to the printer to be proofed, they are damp and the paper sticks in places. In such a case the paper must be removed from the negative at once or it will leave stains. Remove the paper by rubbing lightly with a tuft of cotton moistened with alcohol. If the stains show, fix the negative again in a hypo bath. Another way to remove the bits of paper is by rubbing with the end of a match dipped in alcohol.

256. This trouble is also caused by the paper sweating and sticking to the film, and can be overcome by using a felt pad back of the paper in printing frame. A better scheme is to flow the negatives with negative varnish.

257. Dusting negatives with pulverized soapstone and brushing off will prevent sticking.

258. This trouble of paper sticking is liable to happen in the spring or fall, or when there is a long season of damp weather. The paper, negatives and pads in frames become moist, causing the trouble.

259. **Keeping Large Prints in Contact.**—Much trouble is often caused in printing from large negatives by the paper cockling and throwing the print out of contact. This can be overcome by using a pad of common white oilcloth on the print. Place the oilcloth with the finished side down. It may be necessary to use a felt pad on top of the oilcloth. Another way is to thoroughly warm the pad before putting it on the print, thus keeping the paper dry. If you should find a spot not printing in contact, rub the glass side of the negative over the spot with the finger or palm of the hand until the glass is warm, and it will draw the paper in contact at once.

260. **Weak Prints.**—Weak looking prints very often come from failure to print dark enough. Make three prints, one as you think it should be, or as you have been printing, the second a shade darker and the third still darker. Tone them, select the best and use it as a guide. Weak prints are also caused by printing in an extremely cold room, or from chilled negatives. The use of extremely cold water will also cause weak prints. Either of these causes will chill the paper, and produce weak tones.

261. **Properly Preparing the Gold Toning Bath.**—Difficulty will be experienced in making the gold bath test properly, if the litmus paper (both red and blue) is old, or of poor quality. All

chemicals employed should be fresh and of the best grade. Be sure that the various stock solutions are made up in accordance with the formula. Never add borax until you have ascertained the condition of the gold bath, by testing with red litmus paper. If the bath is not alkaline in its action, i. e., if it does not change the red litmus paper blue, add borax quite cautiously.

262. **Prints Toning Too Slow in the Gold Bath.**—If the prints tone too slow in the gold bath, it is either because you are not using sufficient gold, or the prints have not been thoroughly washed to eliminate the preservative and excess of free silver. Strengthen your gold bath by adding a little more gold, which has been previously neutralized, being careful that your preliminary washings are thorough.

263. **Prints Toning Too Fast in the Gold Bath.**—If the prints tone too fast in the gold bath it is because the bath is too strong. Reduce strength by adding water. Add a little at a time until the prints tone at the proper speed. If the prints show bleaching in the whites before the shadows are toned far enough, it is because the bath is not sufficiently alkaline. Add more alkali. If the gold bath is acid it bleaches out the detail in the highlights. The whites are made to take on a pinkish shade and the shadows become weak and tone slowly.

264. **Uneven Tones.**—This is generally caused by not using enough water directly after toning in the gold bath. In transferring prints from the gold bath they carry a certain amount of gold into the wash water, and unless there is plenty of water they will continue to tone in patches. Use plenty of water, and if the batch of prints is large, or the tray small, change the water frequently.

265. **Uniform Tones.**—A formula for a gold bath is intended for prints from average negatives.

266. No bath will tone prints from strong, contrasty negatives and prints from weak, thin negatives, in the same batch, and give uniform results, unless the quantity of alkali added to the bath is regulated according to the character of the negative from which the prints are made.

267. A good printer, toning a large batch of prints from different kinds of negatives, will sort over his prints in the last wash water, laying the contrasty ones on one side of the tray, the weak, soft ones at the other. First he will use one of the softer prints to test his bath, adding enough alkali to hold the highlights and half-tones from bleaching. He will then tone all the prints from the thin negatives and test the bath again before toning the contrasty prints, using as a test, a print from a hard negative. It will be found necessary to use more alkali to hold the highlights in the

contrasty prints. After adding enough alkali to prevent the highlights in the contrasty print from bleaching, tone the rest of the batch. This is the only way to average up tones in a large batch.

268. On the other hand, if the prints in a large batch are not sorted out and a contrasty one is used to test the bath, the prints from the soft negatives will not clear up, and will result in muddy highlights and half-tones. Or, if a soft print is used to test the bath, the contrasty prints will bleach in the highlights. That it will always pay to sort out the prints in the last wash before toning, and add alkali to the bath to suit the character of the prints, is apparent.

269. A strong, contrasty print will stand more toning than a print from a thin negative. The latter will "blue up" and flatten in the hypo, if toned as far as a print from a contrasty negative. Another point a printer should remember is, that old paper does not require as much alkali as fresh paper.

270. **Flat Prints.**—Caused by printing from a flat, weak negative. They are oftentimes the result of insufficient toning in the gold bath, which leaves the shadows a bricky red. An excessive amount of salt in the toning bath will also cause flatness.

271. **Prints Toning Too Slow in Platinum Bath.**—There are a number of reasons to which this may be attributed.

272. Using the same tray for both gold and platinum bath. To all gold toning trays a certain amount of gold will adhere. This gold precipitates the platinum and, therefore, the benefit of the platinum is not obtained.

273. Using an iron tray, commonly known as japan, or enamel. If these trays are chipped in numerous places, as they often are—exposing the iron—you will find that the acid in the platinum solution will cut into the iron. This will cause a precipitation of both iron and platinum.

274. If the platinum bath is neutral, or slightly alkaline, the platinum will precipitate. This might occur if the water used in preparing the platinum bath was strongly alkaline. If so, it will be necessary to acidify the water with phosphoric acid before adding the platinum solution.

275. **Black Spots on Prints While in Platinum Bath.**—This is due to some foreign chemical, or matter, getting into the toning bath. In preparing your solution never use a graduate which has been used for a plate, or paper developer, as the least bit of metal, iron, etc., will produce black spots. Filter the water used for the gold bath and platinum solution, as iron rust from the water pipe will also cause these black spots.

276. **Toning Red Out of Prints in Platinum Bath.**—If your platinum bath has been properly prepared, and is acid, you will

experience no trouble in toning the red from the deepest shadows. Only when the platinum bath is alkaline, which causes the platinite to become precipitated, will you meet with this difficulty.

277. **Prints Too Brown After Being Toned in Both Baths.**—If the prints are toned too far in the gold bath there is nothing left for the platinum bath to tone and, consequently, they will turn brown. Insufficient washing between the toning baths and fixing bath will also cause brown tones. Hypo bath being acid is apt to turn the prints brown, as sulphurization is sure to set in.

278. **Unable to Obtain an Olive Tone.**—This will occur if you carry your toning too far in the gold bath and not quite far enough in the platinum bath.

279. **Difficulty in Obtaining Black Tones.**—Prints toned to a blue-black in the gold bath will cause blue tones in the platinum bath. Prints toned to a purple can be toned to a black in the platinum. Prints that are toned to a deep chocolate-brown in the gold bath will make beautiful olive-black tones when toned in the platinum bath.

280. **Bronzing.**—Bronzing in the shadows is generally caused by not toning the shadows properly in the gold bath, and not far enough in the platinum bath afterward.

281. **Poor Tones.**—While at times this may be due to the product that you are using, it is generally caused by one or all of the following reasons:

282. (a) Using dry borax for neutralizing the gold bath instead of a saturated solution made of crystal borax.

283. (b) Using too strong a gold bath, toning in a few minutes, thereby producing a surface tone. This surface tone will cut off almost entirely in the fixing bath.

284. (c) Insufficient preliminary washing, consequently failing to remove the preserving chemical, causing the toning bath to become acid.

285. (d) Platinum bath made up with a strongly alkaline water which was not previously acidified, thereby precipitating the platinum.

286. (e) Not neutralizing or acidifying the prints after coming from the gold bath and before placing in the platinum bath; consequently carrying considerable alkali into the platinum bath, thereby precipitating the platinum.

287. (f) Carelessness in preparing the hypo bath, guessing at it, as it were, with the result that the strength of the hypo might vary from 30 to 50 degrees.

288. (g) And still another reason is printing too lightly.

289. **Hypo Stains.**—Washing prints before toning in the gold bath, in trays that are used for washing the prints after fixing.

Not washing the hands often enough when handling the different trays. Wiping the hands on dirty towels. Toning the prints too near the fixing tray. Careless handling of the hypo. These are some of the many causes for hypo stains.

290. **No Strength or Brightness to Prints After Fixing.**—Extremely slow toning in the gold bath; gold bath being too alkaline; extremely slow toning in the platinum bath; using too much alkali in the wash waters would cause the prints to become weak and lose all brilliancy after fixing.

291. **Prints Bleaching.**—All prints will grow somewhat lighter in the hypo, but this is not bleaching. A print that bleaches loses all detail in the highlights and the shadows become weak. If the hypo bath is acid the prints are sure to bleach. Always test your hypo bath and neutralize it, or make it slightly alkaline if necessary.

292. **Bleached Prints.**—Prints will bleach if a poor quality of borax is used. Powdered borax frequently contains impurities, and it is for this reason we recommend the use of crystal borax. Always aim to have the borax solution a saturated one. If you use a hypo bath too strong it is apt to cause bleaching. In preparing hypo by hydrometer test, carefully test the hydrometer from time to time, as the paper scale inside of the tube designating the strength is liable to slip down. If this happens it would register the strength of the solution incorrectly, probably causing it to be three or four times too strong. To test your hydrometer place it in plain water. If it is correct, it will test zero.

293. **Red Spots.**—Red spots on paper may come from a number of causes. The most common are unclean trays, finger marks, bubbles, and preservative chemicals still in the paper. When from finger marks they can be easily recognized.

294. When the spots are round, or oblong, and have defined edges, they are from bubbles and can be avoided by sliding prints under the water in the first washing. If the red spots are uneven and scattered over the paper, or if the prints act as if they were greasy when they are in the washing water, the trouble comes from oil or grease, which may come from the hands, trays or water.

295. This trouble can be overcome by adding one ounce saturated solution of carbonate of soda to each gallon of the first wash water, handling prints over in this water for five minutes.

296. This alkali cuts off all oil or grease on the prints and neutralizes the acid preservative chemicals in the paper. The six changes of clear water afterward wash out all trace of the alkali, and bring the prints up to the gold bath in a perfectly neutral condition.

297. Red spots which appear on the paper after gold toning can be removed by putting the prints in the gold bath face down

and keeping them under the bath for four or five minutes before turning them face up, when the red spots will have disappeared. Should they not do so, put a drop of the platinum stock solution on the spot, which darkens the spot, and the rest of print tones up to it.

298. **Black Spots.**—Black spots, when they show a star or comet-like effect on paper in the first wash waters, are caused by small particles of iron rust in the water, which may come from the inside of water pipes, and are often caused by a sudden jar to the pipes in some portion of the building, setting free small particles of iron rust on the inside of pipes, also from iron pumps or iron roofs.

299. A good filter can be made by taking two thicknesses of chamois, and tying them around the faucet. The chamois does not allow the least particle of dirt to filter through, and can be washed and changed each day.

300. Black spots showing the same comet-like effect are often caused by using metal cut-outs. Small particles of the metal are ground off and settle on the surface of the prints. When wet, this metal will reduce the silver in spots. Dust each print carefully after trimming, face and back, or, better still, trim prints after they are toned. Never use a steel or iron cut-out. Celluloid cut-outs are the best.

301. Black spots may be caused by using enameled trays that are worn down or chipped, exposing iron parts. Prints coming in contact with these parts often show black spots, or rust spots. This is also the case where printers employ home-made oilcloth lined trays, using iron tacks or nails to fasten the oilcloth around the edge of tray. These nails rust and hands coming in contact with the nails carry the rust to the wet prints, causing black spots. Copper tacks should be employed to fasten the oilcloth on the tray.

302. **Yellow Whites.**—(a) Yellow whites may come from prints not being toned far enough in the gold bath, or from trying to wash prints in running water between gold and platinum baths; or between platinum bath and hypo. Running water will not do. Prints should be washed by hand and the water changed.

(b) Yellow whites are sometimes produced by gold bath being too alkaline.

(c) If prints turn yellow in first wash water it is usually due to a trace of hypo from the hands or trays.

(d) The use of an old platinum bath, over and over, will frequently cause yellow whites.

303. **White Spots.**—White spots are caused by insufficient handling in hypo bath and not handling in the washing water after fixing; also by not drying fast enough. Sometimes they

are caused by drying between cheap blotters and newspaper stock. Undissolved hypo in the fixing bath will also cause small white and yellow spots.

304. **Yellow Spots.**—Trouble of this nature may come from a number of causes, such as: Using impure or old blotters; insufficient washing after hypo bath; using old paste for mounting prints; impurities in mounts; slow drying of prints; or cheap manila envelopes containing chlorine, or other chemicals, which the face of the print is allowed to come in contact with.

305. The principal cause of yellow spots which show on the mounted prints, after they have been stacked and put away, is moisture in the mount. This moisture drawing through the stacked prints causes the bleaching chemicals and coloring matter in the mount to act on the paper, bleaching, and causing stains, or spots. Much of this trouble can be avoided by running prints through a hot burnisher with cardboard over face of print. By doing this the mount is thoroughly heated and dried out, which will prevent the trouble in almost every case. Rubber bands will also cause yellow lines on face of prints.

306. **Backed Prints Turning Yellow in Spots.**—Unless the backing paper has been thoroughly washed to eliminate all the acid in the collodion emulsion, this is apt to occur.

307. **Yellow Streaks.**—(a) Sometimes it is caused by stacking the prints on the bottom of the tray in the first wash water without thoroughly wetting the entire lot of prints.

(b) By using the tray for first washing that was used for washing after the prints came from the hypo fixing bath.

(c) Not picking the prints over and over during the entire manipulation, more especially in the first wash water immediately after fixing.

308. **Pink Whites.**—Toning too fast or using a gold toning bath which is not sufficiently alkaline. Using extremely cold water for the preliminary washing. Cold water prevents the eliminating of the acid preservative and causes an acid reaction in the gold bath. Adding fresh gold to the bath without first neutralizing it. Using platinum bath that is not sufficiently acid. But the chief cause of pink whites is lack of alkali in the gold bath. This trouble does not usually show until the prints go into the platinum bath. Usually the pink whites are overcome by the sulphite bath previous to fixing, and the pink is entirely removed.

309. **Black Spots.**—Black spots are generally caused by rust or some metallic substance in the water. If the plumbing is old a great deal of rust will come from the pipes and the water should be carefully filtered. They are also oftentimes caused by using

metal cut-outs. In trimming oval prints before toning, small particles of metal from the cut-out are apt to adhere to the prints, and when they go into the water not only make a spot on the oval prints, but are often transferred to other prints. Brushing the prints carefully after trimming, or trimming after they are toned, will enable you to overcome this.

310. **Prints Fading**—(a) Insufficient preliminary washings and improper toning in gold bath. If the print is not thoroughly washed the gold is deposited on this free silver and you are not producing a true gold tone, as it washes away in subsequent baths.

(b) Improperly balanced gold bath, not alkaline enough to allow the shadows to tone.

(c) An over-acid platinum bath. The acid eating into the shadows instead of toning or depositing the platinum salts onto the print. An over-acid bath is caused by using too much old platinum bath. When bath is weak, the adding of acid to make prints tone. Trying to tone too many prints with amount of platinum employed.

(d) Not washing prints sufficiently after platinum bath, thereby carrying acid into the hypo and causing sulphurization.

(e) Using a hypo bath too strong thus eating out the print instead of fixing it.

(f) Insufficient final washing, leaving hypo in prints, which will cause them to fade.

(g) Not allowing air to circulate through the freshly mounted prints, permitting the chemical in the pulp of mount—and acid coloring of same—to destroy the print by prolonged dampness.

(h) Using sour or acid paste.

(i) Prints, after mounted, drying too slowly; or stacking them up too soon. We have found that even when a fresh paste is used under the above conditions, the paste between the print and the cardboard will turn sour and the paste will, as a rule, fade the prints.

(j) Frequently the fading of a print is due to the hypo in the print or the mount. Many of the cheap grades of cardboard are bleached with hypo, which has never been eliminated. A good plan is to test your mounts, and also the last wash water, to see whether they are entirely free of hypo.

311. PREPARE THE FOLLOWING SOLUTION:

Water	16 ozs.
Caustic Soda	15 grs.
Permanganate of Potash	3 grs.

312. This will give you a pink solution. To test your mounts or card stock, tear the card in small pieces and soak it in distilled water for ten hours. Then pour in your graduate a few ounces of this water in which the card has been soaking, adding to it a little of your permanganate solution. If there is hypo present the pink solution will change to a green. In testing the last wash water, after fixing to insure permanency, simply pour a little of this into your graduate and add the permanganate, as above. If there is any hypo present it will turn green.

313. A mount or print may contain a certain amount of hypo, or acid, and while the mount is thoroughly dry the presence of the hypo will not materially affect the print. But, if the mount becomes moist or damp, the hypo will work up into the print and cause it to bleach, or fade.

314. **Prints Cracking.**—Using extremely cold water for washing is apt to cause the prints to crack. If you are careful about properly flattening and handling the prints during the entire manipulation, there should be no trouble. If the paper is exceedingly dry it is likely to crack. Manufacturers of Aristo Platino paper recommend the use of a moistening box. This box is made of galvanized iron, with a close fitting hinged cover. In this is placed a sponge tray. In order to have the moisture circulate beneath the package of paper, a false bottom is used. This is made of slats. If you have very dry paper, it is a good plan to place it in a box of this kind until it has become sufficiently moistened.

315. **Rubbed Places.**—Rubbed places on face of print which do not show until prints are dried are sometimes caused by rubbing the face of the print on the bottom of tray during washing and toning. When this trouble is experienced examine the bottom of toning trays, also try handling prints face up.

316. Rubbed or marred places on face of print may also be caused by heavy pressure of fingers on back of prints when pouring off wash waters, also by the pressure of fingers on the back of paper when it is being adjusted to the negative.

317. **Blisters.**—Blisters are caused by a change of temperature in the baths or water, and will usually make their appearance in the hypo, or afterward. Putting prints in cold hypo bath and then into warmer water frequently causes blisters. This can be prevented by throwing prints into salt water after hypo bath; four ounces salt to the gallon of water.

318. Another plan,—after the prints are fixed gradually reduce the hypo bath by pouring off part and adding water; repeating until down to clear water, handling prints over all the time. Finally, transfer to regular washing tray.

319. In cases where wash water is considerably cooler than

the air, prints will show blisters when lifted out of the water and exposed to the action of the atmosphere.

320. Too much carbonate of soda in the first wash water will cause blisters. When this is the cause they sometimes appear in the first wash waters before toning. If you experience this trouble, reduce the amount of carbonate of soda in the first wash water, or do not use it at all.

321. Another cause of blisters is gas, or air, in the water. The presence of gas can easily be detected. Fill a glass with water directly from the faucet. Examine it by holding the glass up to the light. The gas will be seen as minute bubbles rising to the surface and clinging to the sides of the glass. In some cases the water is so heavily charged as to produce a slight effervescing noise when the ear is held close to the surface of the water. Water containing gas should be allowed to stand in a barrel, or tub, for from six to eight hours before using, to allow the gas or air to pass off.

322. Extremely old paper, or paper that has been kept in a warm atmosphere and which therefore ages rapidly, is apt to blister. By treating the prints to a strong salt bath after fixing, this can be overcome to a certain extent.

323. **Washing Large Prints After Hypo.**—Have two trays 25x 30 inches, and four inches deep. Bore a row of half-inch holes around sides of tray one inch from top. This allows water to run off without carrying prints over the top. In washing use spray on each print, and change from tray to tray. Ten changes should remove the hypo.

324. **Shaping Prints.**—For Aristo Platino or matte surface prints, run through a cold burnisher. If the mounts split, warm the burnisher just enough so you can hold your hand on the polishing roll. The warmth will prevent splitting. Use plain white cardboard between print and polishing roll.

CHAPTER XII.

Artists' Proofs on Collodio Carbon Paper

Brief General Instruction.

325. **Introduction.**—Collodio Carbon is a matte surface collodion emulsion paper coated on extra heavy stock, and prints on this paper, toned either black or sepia, closely resemble genuine carbon prints. With proper manipulation soft and artistic effects can be secured. The preceding instruction on the manipulation of Aristo Platino and matte papers generally, will assist very materially in enabling you to secure the best results from the very first. As the collodion emulsion of collodio carbon paper is coated on extra heavy stock, it is necessary that the instruction for the different manipulations be carefully followed. In fact, collodio carbon paper, in order that absolutely permanent prints be secured, must receive thorough washing in the preliminary waters, subsequent washings between the toning baths and also in the final washing after fixing. The necessity of cleanliness and carefulness in the use of the different trays can not be too strongly impressed upon those who use this class of paper.

326. Collodio carbon paper being of heavy stock, prints made on it will look better when a liberal margin surrounds the picture—the margin serving as a mount. This margin is obtained by masking the negative and using a large printing frame suitable to the size of the mask. This paper printed with a margin lends itself to beautiful effects in nicely posed subjects, small heads or odd effects, and it is especially effective for landscape work. (Full di-

rections regarding the masking of the negative are given in the following chapter "Detailed Instruction").

327. **Printing.**—Collodio carbon paper will print at about the same speed as the platino papers, but must be printed deep for rich results.

328. **Washing Prints.**—As this paper is very heavy it will require more preliminary washing to remove the preserving chemicals and free silver than is necessary with the ordinary light weight papers. At least eight changes of water should be used, handling the prints over in each. Leaving the prints in running water for half an hour without handling will not do. It is not as effective and some of the prints will not be thoroughly washed. After washing, tone in the following gold bath:

329. **Gold Bath.**—

STOCK SOLUTION NO. 1.

Chloride of Gold.....15 grs.
Pure Water.....15 ozs.

Place the chloride of gold in a 16 oz. bottle and add 15 ozs. pure water. Shake well until the gold is entirely dissolved.

330. ACETATE STOCK SOLUTION NO. 2.

Acetate Soda..... 4 ozs.
Pure Water.....10 ozs.

Dissolve this chemical thoroughly by shaking the bottle. Label this bottle "Acetate Stock Solution No. 2."

331. BORAX STOCK SOLUTION NO. 3.

Borax Crystals..... 2 ozs.
Hot Water.....4 ozs.

As borax crystals do not dissolve freely, it is advisable to use hot water for dissolving this chemical. Label the bottle "Borax Stock Solution No. 3."

332. **Preparing the Gold Bath.**—The toning bath is prepared as follows: Into a 2-quart bottle pour 48 ounces of water, and of Stock Solution No. 1 add 1½ ozs., of Stock Solution No. 2, 2 ounces; then thoroughly shake the

bottle containing this compound and allow it to stand for at least twelve hours before using. A longer time will do no harm.

333. When ready to tone add gold enough to make the speed of the bath six to eight minutes. Watch the bath closely to see that the highlights do not bleach. If they do bleach, *add more alkali, regardless of the color of the litmus paper.* Tone the prints in this bath to a purple, leaving considerable warmth in the shadows. After toning place them in clear water.

334. **Caution.**—If prints are toned too fast in the gold bath, they will be flat. The whites should be thoroughly cleared and brilliant when they come from the gold bath. Too much alkali, or a slow bath, will give flat prints and muddy whites.

335. **Washing After Gold Bath.**—Wash the prints in five changes of clear water, handling them over in each water. In the second wash water use three ounces of saturated solution of alum to the gallon of water; or, instead of alum, 1 ounce of salt to the gallon of water; or slightly acidify the second wash water with acetic acid. After this "short stop" washing, the prints must be washed in three more waters. Unless they are well washed before going into the platinum bath, the platinum will precipitate on the tray and not on the print. After prints are washed, tone in the following bath:

336. PLATINUM STOCK SOLUTION.

Water	4 ozs.
Chloro-Platinite	15 grs.
Phosphoric Acid (50% Solution)	2½ drms.

Keep this solution corked and in a dark place.

337. Prepare the bath as follows:

Water	40 ozs.
Platinum Stock Solution	1¼ ozs.

Tone in this bath until the highlights are perfectly cleared, leaving but the slightest trace of warmth in the shadows. Carrying

too far in this bath is likely to flatten the tone and injure the brilliancy of the print.

338. **Washing After Platinum Bath.**—After the prints are all toned through the platinum bath, it is quite important to wash them thoroughly to remove the remaining acid, because if carried into the hypo bath it will produce sulphurization and yellow whites. Wash through five changes of clear water and fix in the following bath:

339. **Hypo Bath.**—Hyposulphite of soda, 15 grs. hydrometer test, or if by weight, 4 ozs. of hypo crystals to 72 ounces of water.

Fix fifteen minutes, handling the prints constantly to insure even and thorough fixing.

340. **Salt Bath.**—After the prints are fixed, place them in a salt bath composed of 4 ounces of salt to the gallon of water. Use plenty of solution and always keep the proportions the same. Allow the prints to remain in this bath about five minutes, picking them over and over during this time.

341. **Final Washing.**—The final washing is more important with collodio carbon than with any other papers, owing to its weight and thickness. The prints should be carefully washed through twelve or fifteen changes of clear water, handling each print separately, after which they may be mounted or laid out to dry.

CHAPTER XIII.

Artists' Proofs on Collodio Carbon Paper.

Detailed Instruction.

342. **Quality of Negative.**—The printing quality of the negative required for this paper is practically the same as for Aristo Platino or matte papers, generally. Bear in mind, however, that a strong, harsh or contrasty negative will not give the best of results. A negative should be fully timed, fully developed, retaining snap and brilliancy. Over-exposure and extreme over-development causes hard, chalky whites and generally unsatisfactory results. The tone produced on this paper is largely governed by the quality of the negative and the depth of printing.

343. **Masking the Negative.**—If it is desired to print from a 4x5 negative select a sheet of paper 8x10, 10x12 or 11x14 inches in size, thus providing for a liberal margin around the picture. First, in order to supply this margin it is necessary to have a large printing frame, the size depending upon the size of the sheet of paper employed. This frame must be fitted with a sheet of plain, clear glass. Next secure a sheet of plain, black opaque paper to fully cover the glass, and with a sharp pocket knife, or regular trimming knife, cut an opening in this mask of a suitable size and shape to suit the negative from which the print is to be made—for example, say 3¾x5½ inches. Be careful that the edges are perfectly smooth, that the corners are square and the final cut-out is absolutely true. Place this mask on the plain glass and lay the 5x7 negative on the cut-out, adjusting it to the opening, and with gum

stickers fasten the negative securely to the mask. After dusting the negative, lay the collodio carbon paper on top of it, backing this paper with a sheet of felt, or two thicknesses of dry blotting paper, then fastening the back of the printing frame as usual. Having the thickness of the negative between the mask and the print will give the necessary blending and overcome the sharp lines which would surely be formed if the mask were between the film of the negative and the paper. It would be a mistake in making prints from 5x7 negatives to allow for less margin than 2½ inches, as the margin adds greatly to the artistic effect of the picture.

344. **Depth of Printing.**—Collodio carbon paper is printed practically the same as other printing-out matte papers, but under no circumstances should the paper be under-printed, as rich results can only be obtained through extremely deep printing. Print until the highlights are quite strongly tinted—at least two or three shades darker than you desire them when finished. Too light printing results in weak and flat looking prints. It is, therefore, necessary to print deeply. For experiments with collodio carbon paper it is advisable to print on small pieces of paper, making several prints, varying the depth of the printing. Then wash, tone and fix these test prints, and note when dry which of those toned give the best results. Once arriving at the proper depth to print, full size sheets may be used and the prints masked in the usual manner.

345. **Examining the Print.**—The greatest of care must be exercised in examining the print during printing, it being necessary to keep the margin perfectly white, as the surface is very sensitive and is easily "flashed." If you examine the print in strong light, the part exposed to the light may become tinted. For this reason, it is *always* advisable to examine collodio carbon paper in subdued light. When printed lay the prints flat, face down, in a perfectly light-tight box or drawer.

346. **Washing the Prints.**—As this paper is extremely heavy, it requires more washing to remove the preserving

chemicals and unused silver salts than is necessary with other matte surface paper of lighter weight. Plenty of water should be used in the tray as this paper does not curl readily on account of its thickness. In the winter months, or in cold weather, the chill must be taken from the water. It requires at least eight changes of clear water to thoroughly wash prints and prepare them for the gold bath. To leave the prints in running water will not accomplish the desired results. They must be picked over by hand carefully between each change. After careful washing prints are ready for the toning bath.

347. **Gold Toning Bath.**—This bath should be prepared according to the formulæ given in the preliminary instruction. The acetate of soda is a very weak alkali, in fact a neutral chemical, and on account of its mild alkaline qualities it is possible to use it in larger quantities and more freely than any of the other alkalies. The use of strong alkalies as restrainers tends to give muddy whites. Although the alkaline action of acetate of soda is weak and its retarding or restraining quality powerful, it would not affect the gold bath to any great extent unless it were allowed to stand for a considerable length of time after being added to the bath. In order that the action of the bath be uniform at all times, it is advisable to allow the gold bath to ripen for a number of hours before using. If possible, the bath should ripen for twelve hours.

348. **Toning in the Gold Bath.**—When the bath is ready for use, pour the entire contents into the toning tray and before proceeding with the toning, place in a graduate ¾ oz. gold solution and add thereto ½ dram of borax solution. Allow this to stand for five minutes and add it to your toning bath, stirring the solution with the hand, after which add ½ teaspoonful of common salt. The salt will, to a certain extent, prevent the whites from bleaching and assist in making the tone more even. Next place a piece of red litmus paper in the bath and add gradually a little of the Solution No. 3, or borax solution, sufficient to turn the red litmus paper blue in about 2 minutes. Re-

member the gold bath must always be alkaline. If the amount of Solution No. 3, or borax, added does not perform this work in the given time, add more of the solution and continue to add a little at a time until the red litmus paper does turn blue. As the water in various sections of the country requires more or less of this solution, exact amounts to use cannot be given. However, there is one thing certain, a gold bath will not work properly unless it is slightly alkaline. It must turn red litmus paper blue in at least 2 minutes.

349. **How to Tone.**—First, proceed to test your gold bath by trying one print. Place the print in the bath and with the right hand spray the solution over the print, watching it tone. If the highlights and shadows tone equally you will know that the bath is working properly. Should they tone chalky, bleach, or eat away, the shadows refusing to tone, you will then recognize that the bath is still too acid, or at least it is not sufficiently alkaline. Add a few drops of borax and continue to add cautiously until the bleaching ceases. After adding alkali until the red litmus paper has turned blue, indicating that the bath is alkaline, if the prints still show signs of bleaching, place a fresh print in the bath. If the bleaching shows in the second print a few more drops of borax should be added. Continue adding very cautiously until bleaching ceases and the print tones down to a rich purple in about 6 to 8 minutes. Should the test print, after toning this far, look clear and snappy in the whites, not bleached nor muddy, the bath is at the right stage and you can proceed with the remaining prints. Judge tone by looking through the prints, or, in other words, examine by transmitted light.

350. It is not advisable to judge prints by looking upon the surface while they lay in the tray. Always hold them before the light, looking through them, and when clear and even throughout you will know that they have been sufficiently toned. For black and white tones the print should be carried to a rich purple, leaving considerable warmth in the shadows. As the prints are toned, place

them in a tray of clear water until you have completed the entire batch. When all are toned, wash the prints through at least five changes of water, handling them over singly in the same manner as in the first washings, thus avoiding blisters which sometimes appear if old paper is used, or when wash waters are not of uniform temperature. To the second wash water, after gold toning, add 1 oz. of salt to every gallon of water used; handle over carefully, separating the prints in the salt bath for five minutes; then wash well in three changes of fresh water. The object of this thorough washing after toning is to free the print from the excess alkali which has been taken on in the gold bath. Should this alkali be carried into the platinum bath, which is an acid solution, it would cause the platinum bath to become alkaline and throw down the platinum to the bottom of the tray instead of depositing it on the prints; thus making it necessary to add more platinum stock solution to the bath in order to secure any tone at all. This, however, is an unnecessary waste of platinum, as well as time, which can be avoided by properly washing the prints to free them from alkali, and have the platinum bath in an acid condition. After freeing the alkali from the prints by thorough washing, they are ready for the platinum bath, which should be prepared at least an hour before using.

351. **Toning in the Platinum Bath.**—Phosphoric acid sometimes results in rendering yellow, muddy prints, on account of not being absolutely pure, or because of its action when used with water containing certain chemicals. If this trouble should arise citric acid may be substituted and the platinum solution can be prepared as follows:

352. Dissolve 8 ozs. citric acid in 8 ozs. hot water. Label this "Citric Acid Solution."

Prepare the Platinum Stock Solution as follows:

Chloro-Platinite	15 grs.
Citric Acid Solution	1 oz.
Water	1 oz.

Shake well until all the platinite is dissolved.

353. For use take,

Water	30 ozs.
Platinite Stock Solution	2 drs.

Use either this bath, or the one previously described in the "Brief General Instruction." After the bath has stood for at least one hour, to ripen, it is in proper condition for toning.

354. Pour the bath into your platinum tray, which must be used for this purpose only, and place the prints in the bath, a few at a time. Keep them in motion, toning until the highlights are perfectly clear and all trace of red has left the heavy shadows. Ordinarily, there is no danger of toning too far in the platinum bath, but there is no need of carrying prints beyond the point at which they appear clear, with the red entirely toned out. Sometimes carrying prints too far in this bath is likely to flatten the tone and injure brilliancy. This is the case, however, only where very strong platinum solution is used. When prints go into this bath first the whites become muddy, but in a short time they begin to clear. Keep prints in this bath until the whites are thoroughly cleared and every trace of brown or purple is removed, even from the deepest shadows. A slow platinum bath gives olive tones, a quick bath gives black tones. If the prints are toned rapidly in the gold bath, they must tone the same in the platinum bath, and *vice versa.*

355. **Washing After Platinum Toning.**—As they are toned, place them in a tray of clear water until all are toned, and then they should be washed in two or more changes of clear water, in order to free them from the acid of the platinum bath. Unless this is done the acid will be carried into the hypo and cause bleaching of the prints. Prints coming from the platinum bath—this solution being strongly acid—are in an acid condition. For this reason, after all prints are toned in the platinum bath it is quite important that they be thoroughly washed to remove this remaining acid, because if this acid is carried into the hypo bath it will

produce sulphurization and yellow whites. Wash through five changes of clear water, handling each print separately. If you find that the last wash water still tests acid it would be well to place the prints in an alkaline bath, prepared as follows:

356. To 100 ounces of water add 2 drams saturated solution carbonate of soda, or borax. Handle prints over in this bath thoroughly and then give them one more change of clear water, when they will be ready for the fixing bath.

357. When there are large batches of prints to tone, especially collodio carbon prints, there is danger of toning some of the prints a little more or a little less in the gold bath; and as the depth of tone in the gold bath governs the color of the tone in the platinum bath, there will be a difference in the shade of the finished print. Before fixing, in order that the prints may be of a uniform tone, place them in a sulphite of soda bath, as follows:

358. **Sulphite of Soda Bath.**—To 60 ounces of water add ½ ounce saturated solution of sulphite of soda. This bath will darken the tone somewhat but all prints will be of a uniform color when coming from this bath. Prints should be placed in this bath a dozen at a time. Handle over for half a minute, or until they become a uniform color and then place directly into the fixing bath, picking them over and over, turning face down. Handle exactly as you would other prints, allowing them to remain in the hypo bath for 15 minutes, keeping them constantly in motion during the fixing.

359. **Hypo Bath.**—The hypo bath should be prepared according to formula given in *Brief General Instruction*, should be tested with litmus paper, and must be neutral or slightly alkaline. If it tests acid, neutralize it by adding a dram, or more, if necessary, of the borax solution. When the red litmus paper turns blue, you will know that the bath is alkaline. Be careful, however, that the matter is not overdone by making the hypo bath too strongly alkaline, as a neutral bath will do no harm and will work satisfactorily.

This bath can be made up in any quantity. It is advisable, however, to use plenty of solution. If more or less bath is used be careful that the proper strength is retained. To repeat a caution: It is advisable to prepare this bath by hydrometer test, as you will then be more sure of uniform results.

360. **Salt Bath.**—After prints are fixed they should be transferred to a salt bath, prepared as follows: Four ounces of salt to every gallon of water. Use plenty of solution, but always keep the solution the same strength. Allow prints to remain in this bath for 5 minutes, picking them over and over.

361. **Final Washing.**—The final washing is more important with collodio carbon than any other paper, owing to the weight and thickness of the stock. Prints should be carefully washed through 12 to 15 changes of clear water, handling each print separately, after which they may be laid out to dry.

362. **Drying Collodio Carbon Prints.**—Collodio carbon prints can be dried flat by the following method: Lay all the prints out on a sheet of glass, face down (being certain that the glass is perfectly clean). Have one overlap the other a trifle. After all are on the glass, lay a sheet of clean blotting paper over the prints, and then with a print roller carefully roll over the blotter and expel all surplus water. Next take each print separately and place between clean, dry blotters, lay a sheet of glass on the top and weight it down. You will, of course, see the necessity of laying these blotters on a perfectly level surface. Allow the prints to remain in these blotters for one hour; then change to dry blotters, allowing them to remain for another half hour, after which for final drying, change again to dry blotters and plain cardboard.

363. **Final Drying and Flattening.**—For final drying and flattening, first lay a dry blotter on a smooth, level surface; covering the blotter with prints face down. Cover this blotter with white cardboard, placing another layer of prints on the cardboard, but face side up; then cover

STUDY NO. 12 See Page 386 BY R. E. WEEKS

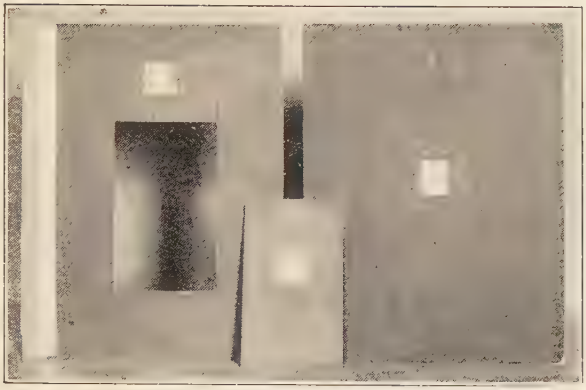


Illustration No 6

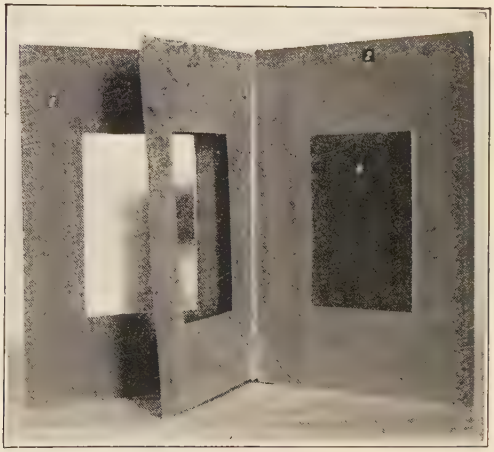


Illustration No. 7
Embossing Device
See Paragraph No. 365

these prints with a dry blotter. Continue in this way, first a blotter, then a cardboard, always having the face of the print next to the blotter and the back to the cardboard. You can stack a large number of prints in this way, and after all have been placed between cards and blotters, place a level board or sheet of glass on top and weight it down. Allow them to remain under weight over night. The prints will dry evenly, and when removed they will not only be dry, but perfectly flat.

364. **Caution.**—It is essential that chemically pure blotters are used for this purpose, as poor blotters might result in spots and stains. Blotters are supplied especially for this purpose by the photographic stock houses, manufactured with a view to photographic requirements. After the prints are dried they should then be embossed as follows:

365. **Embossing Device.**—As this device is cheaply constructed, one should provide himself with numerous sizes covering different size openings. For a cabinet size opening proceed as follows: Take two heavy 10x12 cardboards and from the side of one cut off a strip one inch wide; then take a piece of adhesive tape and paste this strip back in place, making a hinge on this board, numbering it No. 1 (See Illustrations 6 and 7). Next cut an opening 4¼x6 lengthwise, and 3⅝ inches from lefthand side and equal distance from top and bottom. Number this 4¼x6 piece which you have cut out of No. 1, No. 3. Paste a 10x12 sheet of good strong manila paper to lefthand edge of card No. 2 as it lays with the wide side at your left, and paste this paper so it will only adhere about one inch. It will then open and shut like a book. Paste the hinge of card No. 1 on to card No. 2, by placing the hinge of No. 1 even with the left and wide edge of No. 2. The sheet of manila paper should be between the two cards. When paste is dry, lay the book down, No. 2 on the bottom. With a sharp penknife, first cut out the paper between the cards that show in the opening in No. 1. Then take the small card (No. 3) and cut ⅛ of an inch from one side and one end. Apply paste to one side of this small card and fasten it to No. 2

within the opening in No. 1, so there will be an even space on all sides 1-16 of an inch.

366. Your book is now complete and you must place a weight on it and let it become thoroughly dry before you attempt to do any embossing.

367. **Embossing Print.**—When prints are dry, in order to produce the plate-sunk effect, place them face down on the paper guide of the embossing device. Adjust the print to the opening of the guide, always allowing more space at the bottom than at the top of the print. When in proper position close the embosser and turn it face side down, embossing the print by rolling the back with an ordinary rolling pin, or it can be done by pressing around the edges of the opening with a smooth tube like the bottom of a spoon, or even an oval shaped glass paper weight. Anything smooth that will not rub the print will answer for the purpose. After the print is embossed it should be properly engrossed with the name of the photographer. Usually a lead pencil is employed and the name is written in a counter-sunk corner.

368. **Enclosures.**—Collodio carbon prints should always be enclosed in a flexible enclosure, style of which can be selected according to the taste of the artist or customer. Suitable folders in many styles and sizes are kept in stock by regular supply houses. As the material for the folders is supplied by the manufacturers in various grades and colors, the photographer can make them and supply customers with folders entirely original.

369. **General Notes on the Manipulation of Collodio Carbon Paper.**—In drying collodio carbon prints it is necessary to change blotters quite frequently, always using dry blotters each time. If allowed to lie in the blotters in a damp condition, bleached or mildew spots are liable to occur. After the surface is comparatively dry they may be transferred to fresh blotters, or cardboard, as directed, and left undisturbed for 10 to 12 hours. Or, it will do no harm to allow them to remain in the cardboard blotters over night. The prints should be examined before remov-

ing them from the cardboard permanently. If removed before entirely dry they would curl somewhat, so the cardboard and blotters should again be changed and the prints allowed to remain in the fresh dry cardboard and blotters until bone dry. If the prints, being removed from the cardboard slightly damp, are inclined to curl, they may be flattened by moistening the back with a damp sponge, returning them to the dry blotters and cardboard, placing them under a little pressure and allowing them to remain until bone dry.

370. Should prints show a tendency to blister in the hypo or final washing, transfer them, after fixing, to a plain salt water bath composed of water 64 ounces and salt 4 ounces. While blisters are more likely to appear in warm weather, it is still a wise precaution to always use this bath with collodio carbon paper and thus avoid this difficulty.

371. **Practice Work.**—As the chemical manipulation of collodio carbon paper is very similar to platino or other matte surface papers, the advantage of this product lies in the fact that collodio carbon paper is coated on a heavy stock and should, when finished, be similar to matte surface paper which has been backed. With collodio carbon paper there is no necessity for mounting as the prints lay flat, but the paper should be printed with wide margins and also be embossed. In printing collodio carbon paper, of course, the negative must be blocked, and a larger printing frame than the size of the original negative should be employed. The opening over the negative may be oval or square, in fact any shape to suit the negative used. Select a few of your choice negatives and make a few prints. Use paper large enough to give a liberal white margin and after the prints are toned and dried, prepare an embossing device to suit the size opening of the picture you are printing. Emboss the print and engross with your signature. It is then complete. Your first efforts should be filed in the proof file for future reference.

Plate Sinking Device.

A Simplified Method for Light-weight Mounts or Prints.

Plate Sinking Mounts.—Modern ideas regarding the dress for the photographic print have so revolutionized the method of mounting that for even the ordinary class of customers light-weight cards with large margins surrounding the print, or prints made on heavy-weight papers, printed with white margins, are preferred to old-style stock cards. This being the case, the photographer with business instinct must take it upon himself to adopt the simplest and most inexpensive method of preparing such mounts or prints to suit his own trade.

The embossing of the mounting card, as well as of the print itself, enters into the process to such a degree that the most simple method is the one to adopt.

A few sheets of good-quality 10-ply cardboard from which to cut small cards to use as blocks, a square, and a tooth-brush handle, or similar instrument, are the requisites.

Lay the square on a convenient part of the work-table. Then rule off a series of lines at right angles, 12 to 18 inches long and ½ inch apart. (See illustration No. 7*a*.) Now, for a 7x9 plate sunk opening you should use at least 11x14 thin card mounts. This will give you 2 inches margin on sides and top, and 3 inches at the bottom.

First, cut a piece of the heavy cardboard 7x9 inches square. This we will call your **card block.** Lay this card block on the table, having the top and one side correspond to the inner lines previously drawn. To hold this card block in place, insert two thumb-tacks, one at the top and the other at the bottom. The sheet of light-weight mounting board, having been cut the proper size, should now be laid over the

card block face side down and adjusted to the lines, measuring 2 inches from top and side. This will bring your card block in proper position under the mount. By adjusting the mount to lines, the margin will be absolutely accurate. Now, take the round end of a tooth-brush handle, or similar tool, and with slight pressure locate the card block underneath the card mount, by sliding the end of the tool over the card mount until you strike the side of the card block; then, with some pressure,

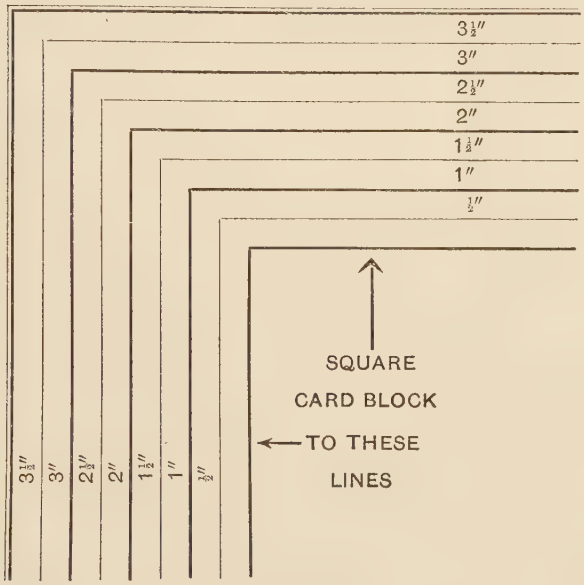


Illustration No. 7*a*

follow this edge all the way around. Turn the card mount face side up and you have a plate sunk mount.

Plate Sinking Prints.—To plate sink a print first measure the print within the margin. Say this measures 5x7 inches. Then, in order to allow for a ¼ inch margin on top and sides, and a ½ inch margin at the bottom, cut a square card 5½x7¾ inches. Next, provide a transparent tissue paper the full size of the print, including the white margin,

and lay the card block in the center of this tissue, and, with a pencil, outline the size of the card block on to the tissue. Next, place the tissue which contains the outline of the card block over the print to be plate sunk, adjusting the lines so as to give the proper margins around the print. With this done, next lay your card block on the tissue, within the lines; then, catching the print, tissue, and card block, *holding them firmly together,* turn them over with the print on top but face side down. Then run the plate sinking tool around on the back of the print, following the outline of the card block just the same as when plate sinking the mounting card.

Different size card blocks should be made to suit the different size openings or plate sunk centers desired. The size of each block should be plainly marked on the face to enable you to readily select from your collection the size required.

CHAPTER XIV.

Toning Collodio Carbon With Aristo Gold and Platinum.

372. **Introduction.**—The following instruction is given so that those who desire to employ Aristo gold and platinum prepared solutions may do so. The instruction given in the preceding chapters, however, regarding the manipulating of collodio carbon papers, applies directly to this work. It is simply necessary to supplement in the preceding directions the following formulæ and suggestions:

373. **Printing and Washing.**—Print until the highlights are well tinted, about as you would print for Aristo Platino. The prints must be carefully washed through eight changes of clear water to remove all free silver, as well as the chemicals. Handle the prints over in each wash water.

374. **Gold Bath.**

Water.....64 ozs.
Aristo Gold, No. 2.....1 dr.
Salt.....20 grs.
Acetate of Soda (Sat. Sol.).....½ oz.
Borax (Sat. Sol.)—enough to turn red litmus paper blue in one to two minutes.

375. This bath should be made up 12 hours before using. Add gold enough to keep speed of bath at from six to eight minutes. Watch the bath closely to see that the highlights do not bleach. If they show bleaching add more alkali, regardless of the color of litmus paper. Tone prints in this bath to a purple, leaving considerable warmth in the shadows. After toning, place prints in clear water.

376. **Caution.**—Too much salt in the gold bath will tend to flatten prints. An excess of alkali or a slow working bath will also produce flat prints with muddy whites.

377. **Washing After Gold Bath.**—Prints should be thoroughly washed, as previously directed, in five changes of clear water, to remove all free gold from the print, before placing in the platinum bath.

378. **Platinum Bath.**

Water	64 ozs.
Aristo Platinum (full strength)	3 drs.

Tone in this bath until the highlights are perfectly clear, leaving but the slightest trace of warmth in the shadows. Carefully wash the prints in five changes of clear water and fix in the following bath:

379. **Hypo Bath.**—Hyposulphite of soda 18 hydrometer test, or 2 ozs. hypo crystals to 32 ounces of water. Fix for 15 minutes. Prints must be handled constantly to insure thorough fixing. After prints are fixed place them, for five minutes, in a salt bath composed of 4 ounces of salt to the gallon of water. Wash thoroughly in from 12 to 15 changes of water, handling each print separately. Then wash for one hour in running water and the prints are ready to mount, or dry.

380. **Another Gold Bath.**—For Black and White Tones.

Water	64 ozs.
Aristo Gold, No. 2	3 drs.
Salt	15 grs.
Acetate of Soda (dry)	¼ oz.

Also a piece of collodio carbon, cabinet size, that has been over-printed, to ripen the bath. Make up bath 12 hours, or more, before using.

381. When ready to tone, add enough alkali to keep

the white drapery from bleaching, while the shadows tone to a deep chocolate or purple.

382. **Alkali.**

Borax (crystals).....1 oz.
Water (boiling hot).....13 ozs.

383. **Note.** (a) In washing collodio carbon paper, plenty of water should be used in the trays. In the winter the chill should be taken off the water. Baths of good depth should always be used. Insufficient washing gives flat, muddy prints.

384. **Note.** (b) Prints should tone in gold bath to thoroughly clear the whites, and should not tone too fast, six to eight minutes being fast enough, as too fast toning gives flat prints. Too much alkali in the gold bath gives muddy prints and yellow whites; too little, gives pink whites and bleached prints. Taking prints too warm in color from gold bath gives olive tones when they are dry. Toning too far produces blue blacks. A ripened gold bath will always give better results than a fresh one. Do not use an old gold bath.

385. **Note.** (c) Instead of alum, some prefer salt as a short-stop in the second water after the gold bath; about two ounces of salt to the gallon of water. Another good short-stop is water made slightly acid with acetic acid.

386. **Note.** (d) If prints are not thoroughly washed between gold and platinum baths and platinum and hypo baths, muddy whites will result.

387. **Note.** (e) If prints show blue in platinum bath, and have not been toned too far in the gold bath, reduce the speed of platinum by adding water, and warm the bath slightly. If they show too much olive strengthen the platinum bath.

388. **Note.** (f) Should the whites show bleaching, or cutting out, in the hypo bath, add enough saturated solution of borax to turn red litmus paper blue in one minute.

389. **Note.** (g) Prints on collodio carbon paper will

dry a shade darker in tone. They should show a slight trace of olive in the wash water if black tones are desired when dry.

390. **Note.** (h) Dry prints can be straightened by dampening slightly on the back with a sponge and then subjecting them to pressure until dry, when they can be trimmed and mounted.

391. **Note.** (i) If vignetted prints show yellow around edge of vignette, the bath is too alkaline. Tone the vignetted prints first, adding more alkali for the plain prints.

CHAPTER XV.

Difficulties—Artists' Proofs on Collodio Carbon Paper.

392. The general manipulation of collodio-carbon paper is practically the same as for other matte surface papers, and the majority of the difficulties are covered in previous instruction. However, a few additional difficulties you may encounter follow:

393. **Eliminating the Free Silver.**—If you have any difficulty in this manipulation, it is probably because the water is acid. If you find the water does not take on a clear, or possibly very slight milky appearance, neutralize it by adding a small amount of carbonate of soda, which will cause the free silver to wash out more readily.

394. **Shadows Toning Before Whites Are Clear.**—This will happen if your bath contains too much gold, tones too rapidly, or, if an excessive quantity of acetate of soda has been added. Paper badly discolored from age, or which has been kept in a high temperature, will tone in the shadows before the whites are clear.

395. **Knowing When Prints Are Sufficiently Toned.**—Practice and close observation only can teach you this. Watch results. Remember that the final tone is almost entirely governed by the amount of toning in the gold bath. If the prints are too red when coming from the gold bath, the resulting tone in the platinum bath will be olive. Toning too far in the platinum bath will produce blue blacks.

396. **Chalky Whites.**—Generally caused by acid water, or acid hypo. Neutralize the water or the hypo and you will readily overcome this difficulty.

397. **Pink Whites or Highlights.**—If there is insufficient alkali in the gold toning bath, or if the toning bath is acid, pink whites and highlights will be produced.

398. **Muddy Shadows.**—Caused by using too much alkali in the gold toning bath.

399. **Muddy Whites.**—If prints are not thoroughly washed between the gold and platinum baths and between platinum and hypo bath, muddy whites will result.

400. **Prints Turning Blue in Platinum Bath.**—If the prints turn blue in the platinum bath, even though they have not been toned too far in the gold bath, it shows the platinum bath is too strong. Reduce the speed by adding water and also warm the bath slightly.

401. **Prints Too Olive in Platinum Bath.**—If they have been toned to the proper depth in the gold bath when this occurs, it shows that your platinum bath is too weak. Strengthen by adding more of the platinum solution.

402. **Edges of Mask Are Vignetted, Showing Yellow.**—This is a certain sign that your gold bath was over-alkaline.

403. **Prints Blistering.**—Blisters are generally caused by change of temperature in baths or wash waters, and usually appear in the hypo, or immediately after. When you are preparing the hypo bath the fresh hypo crystals reduce the temperature of the water. Putting the prints into this cold hypo bath and from there into the warmer wash water causes blistering. To a great extent, this can be prevented by the use of the salt bath after the hypo bath, as already recommended in the instruction.

404. Whenever the wash water is found to be considerably cooler than the air, the prints are likely to blister when lifted from the water and exposed to the action of the warm atmosphere. Too much carbonate of soda in the first wash water is also liable to cause blistering. When it occurs from this cause it generally shows in the first wash waters before toning. If this is the case, use less carbonate of soda in the wash water. If you experience no trouble with the staining of prints and prints wash freely, use no carbonate of soda at all.

405. It is also claimed that another cause for blistering is gas or air in the water. The presence of gas may easily be detected by simply filling a glass with water directly from the tap. Examine it by holding the glass up to the light. If there is gas present it will show by minute bubbles rising to the surface and clinging to the sides. Water like this should be allowed to stand in a barrel or tub from six to eight hours before using, which will allow the gas or air to pass off.

406. Still another cause, which we believe is the main one, is the use of old paper. Cases have been noted where paper that was old and somewhat discolored blistered so badly when placed in water that the entire emulsion floated from its support (the paper). This has occurred not only on collodio carbon, but with Aristo Platino and almost all other makes of matte surface printing-out paper.

CHAPTER XVI.

Sepia Toning of Collodio Carbon, Aristo Platino, and all Collodion Matte Printing-Out Papers.

407. Collodio carbon or any collodion matte surface paper lends itself quite naturally to warm tones, and by means of the different formulæ employed any desired shade ranging from a brick red to a yellowish brown can be produced depending entirely, of course, upon the manipulation of the formula employed and the preference of the photographer.

408. **Printing Quality of Negatives.**—While beautiful sepias can be made from any negative which is suitable for collodio carbon or matte papers, you will find soft, brilliant negatives, full of detail, give the finest sepia prints. Do not misunderstand what is meant by a soft negative. A thin, under-exposed or under-developed negative is not a soft negative. A negative fully timed, fully developed—not over-developed, but developed so the highlights as well as the shadows are filled with detail—printing fairly rapid, *is* a soft negative.

409. **Proper Depth of Printing.**—For the toning formula given in this instruction, print two shades lighter than for black and white prints. The same rules govern the varying printing qualities of negatives for sepia, as for black and white prints.

410. **Washing.**—It is equally as essential for the sepia tones as it is for the black and white prints, that the preserving chemical be entirely eliminated from the paper before toning. This can only be accomplished by thorough

washing according to previous instruction. It will require at least from 6 to 8 changes of water, depending on the condition of the paper. Fresh paper requires more washing than old. Between each change the prints must be picked over and over.

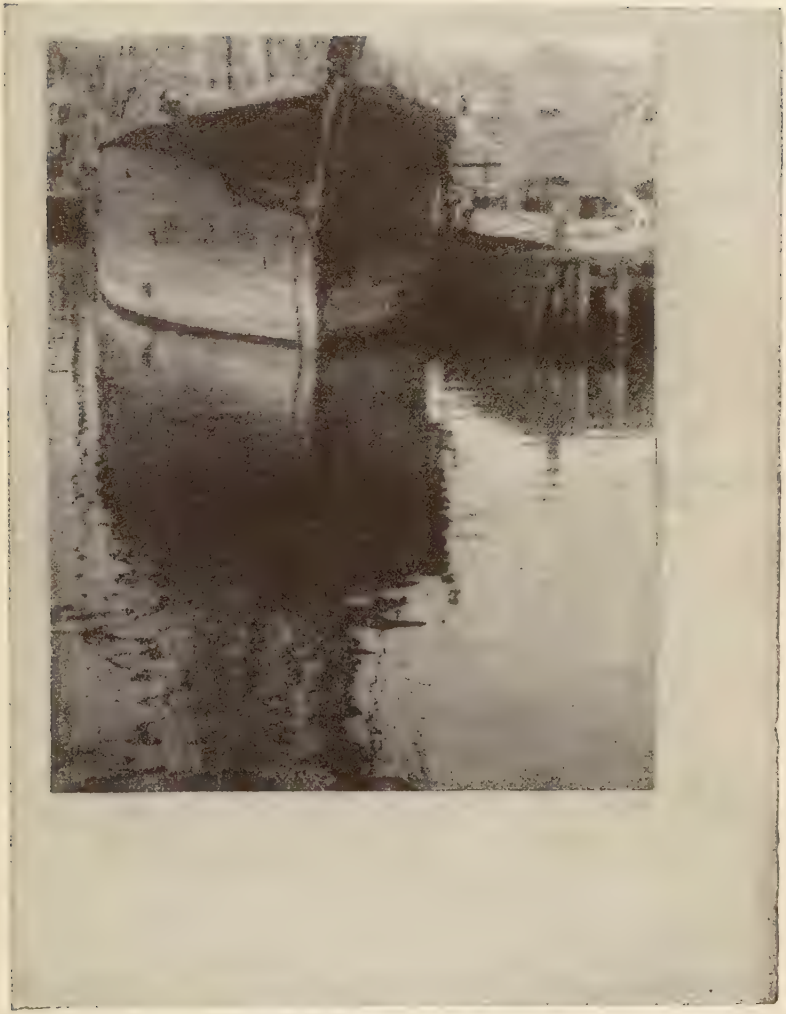
411. When thoroughly washed tone in the following bath, which should be made up at least two hours before using:

Water	64 ozs.
Acetate Soda (Sat. Sol.)	6 drs.
Chloride of Gold (Stock Sol.)	1 oz.

It is essential that this bath be made up at least two hours before using, to insure thorough ripening.

412. **Toning.**—To tone proceed as before directed, toning first one or two test prints. If you find that the whites bleach add more borax. Tone until the highlights are clear and the shadows a bright cherry red. This bath must not be too strong and yet must not tone too slowly. The proper tone will be reached in from two to four minutes. When your prints reach the proper stage, that is, when the prints are clear, place them in fresh water. Most failures are caused from over-toning in the gold bath; so work cautiously and tone only sufficiently to remove the yellow from the print, leaving the shadows very red but clear and crisp. Always judge the prints by looking through them by transmitted light.

413. As you proceed with your toning occasionally pick the prints over in clear water, so they will not become matted together. If the batch of prints is an unusually large one, occasionally change the water. As a large number of prints will carry a considerable amount of gold from the toning bath into the wash water in which the prints may continue toning, a change of the wash water is recommended after half the batch has been toned. When all the prints are toned, wash through two clear waters



IN HARBOR

Study No. 13

See Page 386

By Wm. H. Phillips

PORTRAIT

STUDY NO. 14 — BY RUDOLF EICKEMEYER

(using plenty of water), and place in the following checking bath:

414. **Preparing Alum Bath.—**

ALUM BATH.

Water	64 ozs.
Sat. Solution of Alum	2 ozs.

415. Keep prints in this alum bath for 10 minutes, handling them over carefully. The prints will not show any change in this bath, as the alum is used only to set the tone. Remove the prints to clear water and give them at least four changes, picking them over and over during each change. They will then be ready for fixing.

416. **Preparing Fixing Bath.**—This bath should be prepared by hydrometer test 15 grains strong, or if hypo crystals are used—2 ounces of hypo to 45 ounces of water.

417. **Fixing.**—Proceed with the fixing as previously instructed for the black and white tone on collodio carbon.

418. **Washing.**—After prints are fixed, wash by hand through 15 to 18 changes of water, handling each print separately, in order to entirely eliminate the hypo. They will then be ready for drying.

419. **Remarks.**—Sepia toned prints will dry about two shades colder in tone than they appear when wet, so calculate accordingly. Should prints show bleaching in the hypo bath, a few drops of strong water of ammonia will stop this trouble. Or, a half ounce of borax to each gallon of fixing bath will also prevent bleaching. Alum should always be dissolved in scalding hot water; it will then dissolve more readily. As alum throws off a certain amount of sulphur, by dissolving in hot water the sulphur will be released more quickly. Allow the alum to stand until cool and there will be less danger of sulphurization.

420. The use of salt in the gold bath gives browner tones. Toning further in the gold produces colder tones.

Prints from soft, snappy negatives make the best sepia tones.

421. **Warmer Sepia Tones.***—Prints for sepia toning in this bath must be printed only one shade deeper than you desire the finished print. The prints will not lose any in washing, and as the gold bath is weak and you do not tone deeply—only enough to clear the whites—you will readily understand why it is not necessary to print so deep.

422. **Salt Bath.**—Wash your prints as usual by hand, but in the third change of water add one ounce of salt to every two quarts of water that you are using for this wash. Separate the prints carefully, and it is well to handle them over several times in the salt bath until they become a bright red. It is for the purpose of turning the prints red that the salt is added. After this bath, give the prints three or four more changes of fresh water.

423. **Preparing Uranium Gold Toning Bath.—**

Water	60 ozs.
Nitrate of Uranium	1 dr.
Chloride of Gold (Stock Sol.)	1 oz.
Salt	2 ozs.

424. Neutralize this bath with bicarbonate of soda. In previous baths we used borax for neutralizing; for this bath, however, use nothing else but the bicarbonate of soda. Make the bath quite alkaline, and keep the whites from bleaching by the addition of bicarbonate of soda. Nitrate of uranium toning bath gives exceedingly warm tones. Bicarbonate of soda as a neutralizer has the same effect, while salt holds warmth in the toning bath and assists in evening the tones; therefore, the above method is recommended for very warm tones. This bath must

***Note.**—While this bath gives warm tones, yet prints toned in a nitrate of uranium bath are not always permanent, so for that reason it is not recommended.

not work fast, but tone slowly and evenly. Just as soon as the whites are clear the print is toned and must be placed directly into a **short-stop bath** prepared as follows:

Water.....60 ozs.
Saturated Solution Oxalic Acid.....1 oz.

425. This solution sets the tone, the prints becoming very acid in this bath, so the acid must again be eliminated from the prints by thorough washing before fixing; otherwise sulphurization will take place.

426. After all are toned wash in three changes of clear water. They will then be ready for fixing.

427. **Preparing Hypo Bath.**—Hydrometer test 10 grains strong, or if by weight,

Hypo.....1 oz.
Water.....30 ozs.

428. Fix for 15 minutes, handling the prints over constantly during fixing. After fixing place the prints into a strong salt bath, 4 ounces of salt to each gallon of water; the salt will prevent blistering. After salt bath, wash thoroughly by handling the prints over separately. Sepia prints must not lie in the water and soak for any great length of time, but must be washed as quickly as possible. Twelve to fifteen changes of water, the prints being carefully handled over and over during each change, will wash them thoroughly. The brilliancy of the prints depends upon speedy and careful manipulation throughout.

429. **Remarks.**—Do not use any other neutralizing agent than bicarbonate of soda. Do not have your toning bath too strong. Be sure and have your bath strongly alkaline. Salt in this bath will give warm tones. Do not tone beyond the clearing of the whites, the shadows remaining very red. This should be accomplished in from three to four minutes. Further toning produces cold tones. You can better judge when prints are toned far enough in this bath by comparing with a fresh untoned print.

Place an untoned print beside the print you have toned and it will serve as an excellent guide. Do not allow prints to lag or lay in wash water, but handle them through the different waters as rapidly as possible and get them dry. The rapidity with which you can accomplish this will govern the degree of brilliancy of the results obtained.

430. **Pure Platinum Sepia Toning Bath.**—No gold. Platinum bath only. *Note.* This bath is especially recommended for sepia brown tones and is an excellent universal bath.

431. **Depth of Printing.**—Print as deep as desired for the regular black and white tone, or until the highlights are slightly tinted.

432. **Washing.**—Wash in four changes of clear water, and in the fifth add about a handful of salt to 2 gallons of water. Allow the prints to remain in this bath from 5 to 10 minutes, picking them over to separate them. Leave in the bath until they become a decided yellow in the highlights, then wash in four changes of clear water, and tone in the following bath to color desired when finished.

433. **Preparing Toning Bath.**—

Water	60 ozs.
Platinum Stock Solution	8 drs.
Salt	1 oz.

If prepared Aristo Platinum No. 2 is used in place of the above Platinum Stock Solution, take 2 drams.

434. **Toning.**—Proceed to tone your prints in this bath by handling them exactly as you were previously instructed. The prints should tone in from 6 to 8 minutes. If they tone more slowly, add more platinum. Pay no attention to the bronzing of the prints in the shadows, as this will disappear when the prints are completely toned. Tone the prints until the desired color is reached.

435. **Washing.**—After prints are toned wash in four changes of clear water. In the second water, after toning, add a few drops of saturated solution of carbonate of

soda. The carbonate of soda being strongly alkaline, kills the action of the acid which was carried into the wash waters from the platinum bath.

436. **Fixing.**—Fix prints in the hypo bath, 18 hydrometer test, for 20 minutes.

437. **Salt Bath After Fixing.**—After fixing place the prints in salt water, 2 ozs, salt to a gallon of water, picking them over and over for 10 minutes. After this wash and dry in the usual manner.

438. The platinum bath can be used over and over again by using one-half old bath and one-half fresh water, adding enough platinum to make the speed of the toning 6 to 8 minutes. The best results are generally obtained when using part old bath.

439. **Coffee Tone.**—A very rich brown tone can be obtained on matte surface, or collodio carbon paper, by printing the same as you would for black and white prints and washing in the usual way. Tone first in your regular platinum bath, omitting the gold bath entirely. After toning, fixing and final washing, place them in a bath of strong coffee. The coffee of course must be used cold. Allow them to remain in the bath until the desired tone is obtained, which will require from 10 to 20 minutes. After toning, wash in one change of water and dry between blotters, or if light weight matte surface papers are used lay the print on glass and back it up with backing paper. When dry the prints can be cut off the glass and they will lay perfectly flat.

CHAPTER XVII.

Part I.

Sepia Tones on Matte Papers With Aristo Gold.

440. **Printing.**—Prints should be printed the same as for plain gold toning; about two shades darker than the finished print.

441. **Washing.**—Wash prints in two changes of clear water and immerse in the following bath for five minutes:

Water	100 ozs.
Salt	3 ozs.

Then wash in three changes of clear water and tone in a bath made up as follows:

442. **Gold Bath.**—

Water	64 ozs.
Aristo Gold, No. 2	1 dr.
Uranium Nitrate	3 grs.
Salt	60 grs.

Add enough carbonate of soda (saturated solution) to turn red litmus paper blue in five seconds.

443. This bath should be made up about one hour before using. Should the bath tone too slowly, add enough gold to keep toning speed from five to six minutes. Tone prints to the exact color you desire them when finished, and transfer them from the toning bath into the following check bath:

Water	100 ozs.
Sulphite of Soda (Saturated Solution)	1 oz.

444. After all prints are toned, wash them in three changes of clear water, and fix in the following bath for 20 minutes:

445. **Hypo Bath.—**

Water.....100 ozs.
Sulphite of Soda (Saturated Solution).....1 oz.
Hyposulphite of soda, enough to make bath 15 hydrometer test.

446. From fixing bath throw prints into strong salt bath to prevent blisters, then wash through 12 to 15 changes of clear water, handling prints thoroughly in each wash water, or wash under a sprayer for 20 minutes, handling constantly, then lay out to dry.

447. **Note.** (a) Owing to the extra weight and thickness of the paper the chemicals are not easily washed out. Care and thoroughness in the washing are necessary.

448. **Note.** (b) Prints should be toned to the exact color desired, as the check bath holds the tone, and prints properly handled will dry to the color they were when removed from the gold bath.

449. **Note.** (c) Handle prints constantly in hypo bath to insure thorough fixing.

450. **Note** (d) Should the check bath after toning show a tendency to carry the prints back to a warmer tone than when they left the gold bath, reduce the sulphite one-half. The difference in water and in the conditions you are working under, in many places, may have a tendency to give the prints a slightly warmer tone, if they are left in this bath over 10 minutes.

451. **Note** (e) Soft, brilliant negatives, full of detail, give the finest sepia prints.

Warmer Sepia Tones.

452. **Printing.**—Print a shade lighter than for gold tones.

453. **Washing.**—Wash in eight changes of clear water

before toning to thoroughly remove all free silver. Handle prints over in each wash water and tone in the following bath:

454. **Gold Bath.**

Water.....64 ozs.
Acetate of Soda (Saturated Solution).....6 drs.
Aristo Gold, No. 2.....1 dr.
Borax, enough to turn red litmus paper blue in ½ minute, or sufficient to prevent high lights from bleaching.

455. Tone in this bath until the yellows are just out of the prints. The highlights should be clear and the shadows a bright cherry red. The bath must not be too strong and should tone slowly. This tone will be reached in from four to six minutes. When toned place in clear water. Wash through two clear waters and place in the following bath:

Water.....64 ozs.
Alum (Saturated Solution).....2 ozs.

456. Keep prints in this alum bath for 10 minutes, handling them over. Prints will not show any change in this bath, as it is only used to set the tone. Wash prints when they come from this bath in four changes of clear water.

457. **Hypo Bath.**—Fix in hypo bath, 15-grain strong (hydrometer test), or two ounces hypo crystals, to 42 ounces water, for 15 minutes. After prints are fixed, wash two hours in running water, or 15 to 18 changes by hand. Lay out to dry. After prints are dry they can be straightened by dampening slightly on back with a sponge and then putting them under pressure until dry, when they are ready to be trimmed and mounted. Prints toned in this way will dry about two shades colder.

458. **A Simple Formula for Sepia Tones. Printing.**—Print about two shades lighter than for black and white tones.

459. **Washing.**—Wash in four changes of clear water,

and in the fifth water add two ounces salt to every gallon of water. Allow prints to remain in this wash five minutes, or until they have turned to a golden yellow. Then wash in three more changes of water, and when finished, tone to the color desired in the following bath:

460. **Gold Bath.—**

Water	80 ozs.
Aristo Gold, No. 2	1 dr.
Salt	½ oz.

461. Borax, enough to turn red litmus paper blue in 10 seconds. Speed of toning, about 8 to 10 minutes.

462. After prints are toned place in stop water, two ounces salt to the gallon of water.

463. **Hypo Bath.**—Then fix in hypo bath, 15 grains hydrometer test, for 15 minutes. Wash as usual.

464. This formula will produce any tone from a bright cherry sepia down to a cold brown, the intermediate tones depending on depth of toning.

Sepia Toning with Carbonate of Soda.

465. **Washing.**—Wash prints in three changes of clear water (about 70 degrees Fahr.), then place them in a salt bath (13 ozs. salt to the gallon of water) for five minutes, separating prints constantly, and wash in three more changes of clear water.

466. **Gold Bath.**—Tone in plain gold bath made alkaline with a saturated solution of carbonate of soda. Speed of bath should be about seven minutes. Try it with a print before toning the batch to see that it will not cut out the highlights, or tone too fast. Tone to the color desired in the finished print and put into strong salt check bath.

467. **Hypo Bath.**—Wash through one water and fix for 15 minutes in hypo bath 12 grains strong. From hypo

bath place prints in a salt wash (four ounces salt to one gallon water) for five minutes, then wash as usual.

Part II.

Carbon Purple Tones.

468. **Printing.**—Prints should be made a medium depth; that is, deeper than for sepia tones, and not quite as deep as for black tones. In a general way, print until the highlights are only slightly tinted.

469. **Washing.**—Wash prints through four changes of water; for the fifth change take two gallons of water, to which add two drams saturated solution of sulphocyanide of ammonia. Put prints into this bath, separate them thoroughly, handling them over for five minutes, then wash through four changes of clear water and tone in the following bath:

470. **Toning Bath.**—

Water.....128 ozs.
Aristo Gold, No. 2 (full strength)..... 3 drs.
Phosphate of soda (saturated solution), enough to turn red litmus paper blue in six to eight seconds.

471. Tone until a slight purple cast is noticeable through the half-tones. Prints should be made to tone to this point in about five minutes. Then place the prints into a stop water as follows:

Water.....2 gals.
Sulphite of Soda (Saturated Solution).....1 oz.

472. The last prints thrown into this stop water should be allowed to remain for 10 minutes. Then wash through four changes of clear water.

473. **Hypo Bath.**—Fix in hypo bath, 15 hydrometer test, for 15 minutes. When fixed, place in salt water (a handful of salt to one gallon of water) for five minutes,

then wash thoroughly through at least 12 changes of water.

474. **Note.** (a) The gold bath should be fresh; it should not be made up more than one-half hour before using.

475. **Note.** (b) The sulphocyanide bath is used to prevent the whites from bleaching and prepare the prints for a uniform toning in the gold bath.

476. **Sepia Tones on Aristo Platino Paper.**—For rich sepia tones the paper should have age enough to print a rich cherry red color.

477. STOCK SOLUTION NO. 1.

Sulphocyanide of Ammonia	1 oz.
Water	1½ ozs.

478. Print fully one shade darker than for plain gold toning, carefully avoid printing too deep. Wash prints in three changes of clear water and immerse in the following bath:

Water	64 ozs.
Stock Solution No. 1	½ dr.

479. Handle prints over in this bath until they have turned a decidedly yellow color, which will take from two to eight minutes; then wash in four changes of clear water and tone in the following bath:

Water	30 ozs.
Aristo Platinum (full strength)	3 drs.

480. Tone in this bath until by transmitted light the yellow has disappeared, the highlights have cleared, and the prints are a rich cherry color. This takes from five to eight minutes. After prints are toned, throw into clear water made slightly alkaline with liquid ammonia. Then wash in four changes of clear water and fix in plain hypo (15° hydrometer test) from fifteen to twenty minutes, or until

the desired color is obtained; then wash and mount same as usual.

481. Should warmer tones be desired, proceed as follows: After prints are through the platinum bath as given in the above formula, throw into water made slightly alkaline with ammonia; wash through four waters and place prints in the following:

Saturated Solution of Alum	½ oz.
Water	64 ozs.

482. Handle prints in this alum bath five minutes; then wash through three changes of clear water and fix in plain hypo bath, 15 grain strong, hydrometer test, for from fifteen to twenty-five minutes, or long enough to clear the yellow and bring the print to a rich cherry color. Wash and mount same as usual.

483. **Principal Causes of Failures.**—Printing too dark. Too much of No. 1 causes bleachings. Not toning enough in platinum bath causes yellow prints. Not fixing until prints are clear and the yellows are out, will give yellow prints.

484. **Notes.**—All sepia prints should be washed quickly and mounted, ten to twelve changes of water being sufficient. Continued soaking in water that is alkaline will darken the tone.

485. Carefully test the hypo bath. If not alkaline, add a few drops of liquid ammonia, or enough to turn red litmus paper blue in three or four minutes.

486. Continued fixing will give darker tones.

487. **Practice Work.**—All negatives do not produce good sepia prints. Medium strength, snappy negatives are the best. However, for the experience to be gained, it is advisable to make prints from different classes of negatives, following instructions closely regarding the depth of printing, etc., and observing the appearance of the prints from the different negatives as they enter and leave the various baths. As the final color or tone is governed in the

toning bath, a little manipulation here will enable you to produce almost any effect desired.

488. A liberal number of experiments should be made and each of the different baths should be given a trial and a record proof kept of the results of each bath. Only by comparing the prints can you readily decide which bath is preferable to employ. Should you meet with failures during the manipulation, refer to the Difficulty Department which will undoubtedly advise as to the cause, prevention and remedy for your trouble. Careful notes should be made on all test prints and they in turn should be filed in the proof file for future reference.

CHAPTER XVIII.

Difficulties—Sepia and Purple Tones.

The difficulties which we have already enumerated for collodio carbon black and white will, in most cases, apply to the sepia toning. The following however are a number of difficulties which apply directly to sepia toning.

489. **Prints Too Cold in Tone.**—This is simply because you toned a trifle too far—allowed your prints to remain too long in the toning bath. Remember that the prints in drying down become about two shades colder than they appeared when wet.

490. **Highlights Clear but Shadows not Toned.**—This would indicate a bath too acid. Use more alkali. If your bath is properly prepared and the prints correctly washed before toning, you should have no trouble. The only way to overcome this difficulty is to use great care both in the washing of the prints and the preparing of the baths. Also employ enough alkali to restrain the highlights from bleaching until the shadows are toned.

491. **Judging When Prints Have Toned Sufficiently.**—Watch the highlights, the whites, and the whitest parts of the print. When these are clear and mellow—not bleached—the prints are toned, regardless of the red in the shadows. This is, of course, governed almost entirely by the amount of preliminary washing and the proper amount of alkali in the toning bath.

492. **Retaining Warm Tone.**—Do not overlook the fact that your prints will tone down considerably when drying. Take them out of the toning bath a trifle warmer than you would desire to have the finished print and there will be no trouble in retaining the warm tone.

493. **Toning Too Fast.**—This would clearly show that your bath is too strong. Reduce by adding water, and carefully test your bath with litmus paper to keep it properly balanced.

494. **Prints Bleaching in Hypo.**—If the prints bleach in hypo it is a certain sign that either the hypo bath is much too strong, or it is acid. Hypo bath for sepia prints should not be so strong as for black and white—if acid neutralize with borax.

495. **Prints Sulphurizing.**—Prints that are not properly washed before toning, thereby carrying acid into the toning bath, are apt to sulphurize. If the hypo is acid the prints are likely to sulphurize. See that your prints are properly washed and that your hypo tests neutral or slightly alkaline. If you are producing the sepia tone in the platinum bath only, carefully test the last wash water before you place prints in the hypo. See that this water is neutral or slightly alkaline. There will then be no danger of carrying acid from the platinum into the hypo, causing sulphurization.

496. **Streaks in Prints Before Toning.**—This shows either insufficient washing or that the prints have been stacked together for too long a time without separating.

497. **Streaks in Prints After Fixing.**—If you allow prints to remain in the hypo, failing to separate them often enough, streaks are apt to be produced more especially if the hypo bath should be acid. **Prints Lacking Brilliancy.** This is almost a certain sign that your manipulation, toning, washing, etc. (more especially the washing), were too slow.

498. **Purple Tones. Obtaining Too Deep a Purple Tone.**—This is because you carried your toning a trifle too far. Allow for the fact that the fixing and drying down of the prints will cause the tone to become a few shades colder.

499. **Proper Depth of Printing.**—This difficulty has been covered in depth of printing for black tones, and the same remedy will apply for sepia toning.

500. **Prints Toning Too Slow.**—If the prints tone too slowly add a trifle more neutralized gold.

501. **Prints Toning Too Fast.**—Reduce the strength of the bath by adding more water.

Printing Cabinet for Electric Light.

502. One of the most serious handicaps to photographers has been their inability to finish orders on printing-out papers on dark, cloudy days. The Aristo Lamp has been brought into use not only for portraiture, but also for printing, and the Aristo printing cabinet, shown in Illustration No. 8, is so arranged that the printing frames receive a perfectly even illumination. This cabinet is fifty inches in diameter, five feet high, weighing about 112 pounds. The top and bottom sections each contain ten 8 x 10 size printing frames; the central portion is divided into ten sashes, each of which will carry four 5 x 7 frames. Thus it will be seen that when

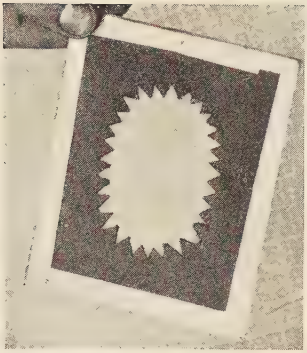


Illustration No. 9½
Vignetting Card
for Gaslight Prints
See Paragraph No. 801

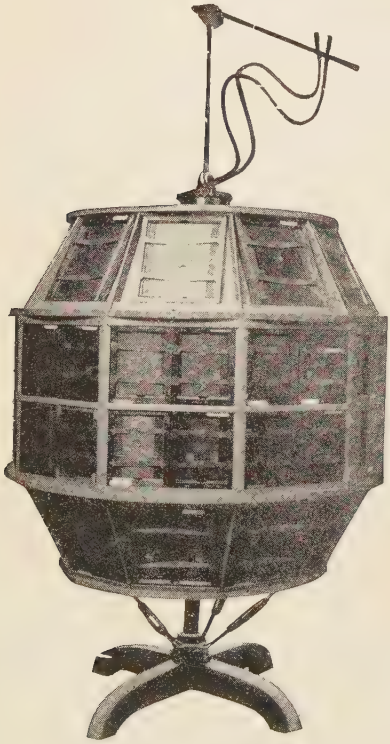


Illustration No. 8
Aristo Printing Cabinet
See Paragraph No. 502

HOMEWARD BOUND
See Page 386

Study No. 15 By R. E. Weeks

the cabinet is completely filled with frames it has a capacity of forty 5 x 7 and twenty 8 x 10 size frames.

503. Should one desire to work only a portion of the capacity of the cabinet, and handle a fewer number of frames, all one needs to do is to place pieces of cardboard in the openings not occupied by frames.

504. In case it is desired to print from 11 x 14 or 14 x 17 size frames, one can easily remove one of the sashes and fit the larger frame in the space made by the removal of the sash.

505. The cabinet is made to revolve and can be turned by the simple pressure of a finger. A printer can sit in an ordinary office chair with a table for changing close by, and reach every frame in the cabinet, change his prints, etc., without moving his chair.

CHAPTER XIX.

Platinum Printing—Black and White.

Introduction.

506. Of all the printing processes, especially those best for the busy photographer, there are none offering the advantages of the platinotype, or platinum process. Among pictorial workers and professional photographers no process occupies a more prominent place. For simplicity of manipulation and charming results that yield most pleasing gradations of light and shade, together with a wide range of half-tones of exquisite delicacy, no printing process is more popular than platinum.

507. **Theory of Process.**—The manufacture of sensitive platinum paper differs quite materially from gelatin and collodion papers, in that it is not necessary to employ a substance to hold in suspension the sensitive salts, as is the case with the regular printing-out papers. Platinum paper is sensitized by coating a chemically pure paper with a solution of ferric oxalate and potassium chloro-platinite. When exposed to light the ferric oxalate is changed to ferrous oxalate, and the ferrous salt, when in solution has the power to reduce potassium chloro-platinite to metallic platinum. As a solution of potassium oxalate will dissolve the ferrous oxalate, it is employed as the developing agent. After the picture has been developed a permanent image is secured by placing the print in a very weak solution of hydrochloric acid, which removes all chemicals, leaving only the metallic image of platinum.

508. **Exposure** varies according to the character of

the negative and the condition of the light, but, when the exposure is complete the whole process of developing, clearing, washing and even mounting can be accomplished in from fifteen to twenty minutes. Taking into consideration the length of time required to print, wash, tone, fix and finally wash the gelatin and collodion prints, it will be clearly seen that the platinum process is a great time saver. In addition to this, there is no difficulty in securing even tones, no troubles with blisters, stains, discoloration, fading and many of the other difficulties with which the photographer has to content in other processes. Platinum paper possessing a matte surface has a texture which gives the picture an appearance similar to a pencil drawing or engraving.

509. The one important caution which must be observed in handling platinum paper is to keep it perfectly dry, as it is very susceptible to dampness. The lump of calcium chloride in each can should be kept perfectly dry, to insure the paper being properly preserved. Dampness has almost the same action on the iron salts as light. It changes the ferric oxalate to ferrous oxalate. For this reason a damp paper must not be printed as far as a perfectly dry paper, because it will develop up so quickly it will get beyond control and become too dark. *Do not print from damp paper.* If it is damp dry it thoroughly before printing.

Platinum Paper—Black and White.

510. **Grades of Platinum Papers.**—Platinum paper is made in different grades to suit various purposes. For instance, the paper manufactured by Willis & Clements, known as the W. & C. Paper, is made in six different grades: Medium heavy smooth (Labeled B B); heavy smooth (K K); heavy medium rough (T T); heavy rough (C C); extra heavy smooth (Y Y); extra heavy rough (Z Z).

511. Paper manufactured by the American Aristotype

Company is made in five grades, as follows: Heavy smooth (Labeled H S); heavy rough (H R); extra heavy smooth (E H S); extra heavy rough (E H R), and medium rough (ivory tint).

512. The Angelo platinum paper is made in two grades, smooth and rough.

513. There are numerous other papers manufactured, but all are manipulated in practically the same manner, the only difference being that some require deeper printing than others; while there are brands which require slower and further development. Warmer or colder solutions are recommended for various papers. The general manipulation in all, however, is about the same, any material change or special manipulation necessary for any particular brand of paper being given in the formula which accompanies each package sent out by the manufacturer. The photographer who has learned to manipulate one grade of platinum paper can generally handle all grades.

Brief General Instruction.

514. Platinum paper is a semi-developing out paper, the image being only partially visible when printed.

515. **Printing.**—For printing, place the paper in a printing frame in the regular way, with the yellow sensitive side in contact with the negative. Print in the sunlight until the half-tones and all detail are visible. As the paper is quite sensitive it should be placed upon the negative and inspected in subdued light during printing.

516. **Developing.**—The print is developed by immersing in the developer from 30 to 60 seconds, or until all the detail is fully developed.

517. **Fixing.**—Directly from the developing bath the prints, without rinsing, are immersed in the acid fixing bath, containing 1 ounce C. P. muriatic acid to 60 ounces of water. After all prints are developed they must be given

four acid baths, of the same strength as the first bath and then washed by handling over in from four to six changes of clear water. They should then be placed between blotters to dry.

518. **Note**: The developing salts supplied by the manufacturers are sold in one-half and one pound boxes, mixed in definite proportions, and must all be dissolved at one time, otherwise the tone of the prints will not be uniform.

CHAPTER XX.

Platinum Printing—Black and White.

Detailed Instruction.

519. Platinum paper is put up in tin tubes and sealed with rubber tape. The sealing is to prevent the air from coming in contact with the paper, and to keep it free from moisture. Each can is supplied with a small package of calcium chloride preservative. This preservative is used to absorb all moisture. If the can were left open for any length of time the air would affect the paper, and from paper affected thus it is almost impossible to produce good prints.

520. The effect of dampness is a lack of vigor, a general muddiness of tone, and where the paper has been exposed to its influence for some days it injures the beauties of the whites. The paper will keep for months, but must be stored in a cool, dry place, in the cans in which it is supplied.

521. In extremely warm summer months a good plan is to place the paper in a refrigerator, or some other cool place. The can containing the paper should always be perfectly sealed with a rubber tape.

522. **Caring for and Preserving the Paper.**—The majority of failures in platinum printing and developing are caused by neglect in caring for and preserving the paper. The greatest trouble is caused by the paper becoming moist or damp. Where it is purchased in cut sheets there is not so much danger of moisture as when you buy it in rolls and cut it up to the required sizes.

523. For the convenience of consumers the manufacturers supply this paper in all regular sizes, a dozen sheets to a can, and it is advisable for those who do not use the paper in large quantities to buy the cut sheets, and only a dozen at a time. For those who are using large quantities of paper, of course, it should be purchased in rolls, as there is considerable saving in cutting the paper to all sizes.

524. Care, however, must be exercised in the handling of the paper. Never allow the fingers to come in contact with the surface of the paper. It is advisable to cut up only enough for the day's printing, then replace the roll of paper and preservative in the can, sealing it up carefully with the rubber tape. The cutting of the paper must be done in a subdued light, and the room must be perfectly dry.

525. The paper which you have cut for use should be placed in another can or light-tight box containing preservative. A wooden box lined with black paper and fitted with a light-tight hinged lid is preferable, and the box should be made large enough to hold both the printed and unprinted paper; a partition in the center will separate the one from the other. Always place the paper in the box sensitive side down. Keep the lid closed as much as possible. If the box is allowed to remain open, or the paper removed from the tube for a few hours before using, the effect of the dampness will be noticeable in the lack of strength and brilliancy in the print. Dampness will cause the highlights to print gray instead of pure white.

526. **Loading the Printing Frame.**—As platinum paper is very sensitive to strong light, loading the frame should be done in diffused light. Direct light falling on this paper will ruin it and cause it to fog. For the benefit of those who have never used this paper, we would say that the sensitive side is the side which appears quite yellow. Place your negative in the frame, after carefully dusting it, and then place the paper on the negative, with the yellow side next to the film.

527. While it is not absolutely necessary, yet it is ad-

visable to back up the paper on the printing frame with a piece of heavy cloth, paper or thin rubber pad. The negative and pad must be entirely free from moisture. The pad will answer two purposes; first, absorbing any moisture or dampness, and second, to bring the paper in perfect contact with the negative.

528. Exercise care in placing the paper upon the negative, that you do not touch the sensitive surface with the fingers. This is important, more especially when the hands perspire freely, as the acid moisture from the fingers will stain the paper, and when developed will show black stains.

529. **Quality of Negative Required.**—Any negative that will make good prints on any printing-out paper will give good platinum prints. Printing from a very thin, weak negative will always result in flat prints. A medium fast printing negative, with plenty of detail in the shadows and plenty of strength, still retaining the detail in the highlights, will always give good prints. Under-exposed and under-developed plates are practically worthless for platinum printing.

530. **The Grade of Paper to Use.**—Rough paper should be used when sketchy effects are desired, and the negative should have good strong printing quality. In portraiture this grade should be used on large heads, but never on small ones. The smoother grade paper should be used where fine detail is desired and for small pictures.

531. **Printing.**—Correct exposure is ascertained by inspection of the paper in a rather weak white light in the usual manner. The sensitized surface before exposure to light, as before stated, is of a lemon color. During exposure the parts affected by light becomes a grayish brown color, and sometimes an orange tint under those parts of the negative which present clear glass or nearly so. As a general rule, all parts of the picture except the highlights should be visible when the exposure is complete. Damp paper gives a less visible image than dry paper; hence it may easily be over-exposed.

532. When printing from thin negatives, care must be taken not to over-expose. As soon as the image is faintly visible it may be considered enough. Negatives that have been well timed and developed to fair density will be found the best. A thin, weak negative will give gray prints; on the other hand, negatives under-timed and under-developed will produce black and white prints without detail in the middle or higher lights. Such negatives should be masked. (See "Doctoring Negatives.")

533. The secret of platinum printing is judging the proper depth to print. It is advisable for a first experiment to use only small pieces of paper for printing until you have learned to judge the proper printing depth, then the regular size can be applied. It is also advisable to select a normal negative to print from with your first experiments. After loading the frame, place in sunlight and print until the image is visible in all parts, although only faint outlines are visible in the stronger portions of the negative. The print before developing will look light and have a weak faded appearance.

534. **Judging Proper Depth of Printing.**—A very good way to judge when your platinum print is printed to the proper depth is to be guided by the strongest highlights. If in a portrait, they are generally found upon the forehead or nose; in landscapes, usually in the sky. These being the highest lights they must not be tinged a particle. Print up to that stage, and no more, and use these highlight portions for your guide in printing. After a few trials you will be able to judge exactly.

535. The exact depth to print can only be determined by experience, for different classes of negatives will require different depths of printing. Strong negatives should be printed in strong light, and when printing in the open sunlight use one thickness of tissue paper or a ground-glass over the negative. Weak negatives should always be printed in subdued light.

536. **Caution**—Avoid over-printing; always endeavor to print to the exact depth that will give a nice, bright

print with about one-half minute development. A print which is slightly under-exposed will be improved by long development. One which is over-exposed, however, cannot be improved in the development.

537. **Doctoring Negatives in the Printing.**—There are few negatives made that cannot be improved somewhat by a little dodging in the printing. Platinum paper lends itself very naturally to dodging. For notes on dodging in the printing see "Special Pointers for the Printer."

538. **Examining Prints During Printing.**—Prints should be examined in subdued or artificial light. Care must be exercised that the prints are not turned back too far during examination, as this would not only make fogging more likely, but would also be apt to break the paper. Do not examine the prints too often. After a little practice you will be able to judge from the strength of the negative how long it will require to print to the proper depth, and frequent examinations will then be unnecessary.

539. **The Developer.**—We recommend the prepared developer put up by the manufacturers, as the proportions are exactly right. The full amount of each package of crystals should be dissolved at one time, as the different crystals are not equally mixed in the package, and should you attempt to divide it into two or more parts you would be quite apt to have more of one chemical in a certain division than in another. These developers may be procured in large or small packages, so there is no necessity for using less than a full package, as the developer keeps well when in solution. In fact it improves with age. Therefore, there is no saving in preparing small quantities.

540. The crystals must be dissolved in hot water and allowed to cool. Never prepare this bath in an iron or tin dish. Use either porcelain or agate ware. The tin or iron would affect the developer and spoil it. After the developer is all dissolved and cooled, pour it into a large bottle. Cover or cork the bottle to keep it free from dust. Label this bottle "Platinum Developer Stock Solution."

541. For those who desire to prepare their own developers we supply the following formula:

Neutral Oxalate of Potash.....3 ozs.
Hot Water.....16 ozs.

542. Stir until thoroughly dissolved, and when cool place in a large mouthed bottle. Platinum developers may be used over and over again. A good plan is to make up about 100 ounces of the solution and use only part of it for developing. When through developing, pour the used solution into a separate bottle labeled "Used Developer," keeping up the required amount of developer by replenishing from the fresh stock solution.

543. **Developing.**—We will suppose that you have made your prints and are ready to develop. Decant a portion of the bath into a rubber tray, which has not been used for any other purpose. We would advise that you never use this tray for other purposes than to hold the platinum developer. Use sufficient developer to cover the bottom of the tray, at least one-half inch deep.

544. Develop the print by sliding under the developer face side up with a steady motion, watching for any air-bells which may appear, and expelling them at once. It should require from thirty to sixty seconds to develop a properly exposed print. A longer time in the developer will do no harm. In fact, prints from contrasty or hard negatives are much improved in the half-tones by prolonging the development, and warm developer will also assist in overcoming harshness.

545. Prints should be developed in a weak light and the temperature of the warm bath should be about seventy-five to eighty degrees Fahrenheit, and cold bath about sixty-five degrees.

546. As before stated, the developer may be used over and over again, by adding a little new to the old bath from time to time. If the bath becomes over-charged with chemicals from the paper, the resulting tones will be poor—

the highlights will bleach. You should therefore watch the developer carefully when using old developer, and just as soon as you notice a change in the quality of the print, make up an entirely new bath. If the developer is too cold you are likely to produce granular prints. The same effects will be produced if the developer is too weak. Rock the trays frequently to prevent markings caused by scum, which is apt to form on the surface of the solution, if the latter is allowed to stand idle for any length of time.

547. It is also advisable to filter the developer before using, so as to remove all particles of dirt, as these particles of dirt settling on the print when first placed in the developer are apt to cause white spots. If the developer is too warm the resulting tone will be brown black. A slightly under-exposed print may be often coaxed up by raising the temperature of the bath and leaving such prints longer in the developer. However, a print that flashes up black will be of no use, as it has been over-printed and even if developed by only a dip would give coarse, mealy, clogged shadows and no half-tones.

548. **Using Two Baths.**—Too cold a bath will give you muddy, harsh shadows and very contrasty results, without detail in the half-tones. When using a warm bath beware of over-printing, as the developing must be carried farther. A good plan is to have two baths, one cold and the other warm. A print that is slightly over-printed, place in the cold bath first and then transfer to the warm bath, or vice versa. You will find this will produce a great improvement.

549. During the hot summer days it is not advisable to unduly delay the development of prints; if possible, develop within one hour after printing. Extra heavy papers require much longer development than the thinner ones. They may be developed as long as two minutes in the developing bath, without injury. All papers produce better prints from a full development. Use good size dishes and plenty of solution, and should the prints appear gray and granular, one of the following reasons will be found to

be the cause: 1—Under-development; 2—Granular or weak negatives; 3—Developer too weak or possibly too cold.

550. When you have finished developing pour this old developer into a separate bottle and label this bottle "Old Developer." The next time you develop decant the clear solution, being careful not to disturb the sediment which settles to the bottom of the bottle and add a little of the fresh stock solution, enough to make up the usual quantity of bath.

551. **Clearing Bath.**—As soon as a print is fully developed it must be placed, face down, directly into a clearing bath made up as follows:

552. **Formula for Clearing Bath.**

Hydrochloric Acid (Muriatic Acid) C. P.....1 oz.
Water.....60 ozs.

Make this up in a large bottle and label "Platinum Clearing Bath."

553. Half fill the tray which you are to use for this purpose with this clearing bath. The quality of the acid used is very important—it must be chemically pure. Ordinary commercial acid will cause yellow prints. The prints must have 3 or 4 changes of acid clearing bath. Allow them to remain in each bath from 7 to 10 minutes and keep them separated. In separating the prints do not draw them over each other, but lift them up carefully. You will note that this paper when wet becomes very soft and pulpy, and the surface is, therefore, easily rubbed. Prints should never be put into clear water until they have passed through all the acid baths.

554. The extra heavy papers require at least five acid baths to properly clear them. They also require a little more washing on account of the weight of the paper. Never use water in the developer or clearing bath that contains iron, as iron has a tendency to turn the paper yellow. Soft water is best for this purpose.

555. It is important that the prints receive proper care

in these clearing baths. Prints are not sufficiently fixed, or cleared, until the water of the last bath is as clear as pure water, showing no yellow tint. This is quite important, as permanent results can only be obtained in this way. The acid clearing bath removes all unacted-upon chemicals from the paper. A platinum print which has been properly treated is composed of nothing but metallic platinum and paper.

556. **Final Washing.**—Wash in plain clear water, using plenty of water, carefully picking the prints over and over and wash them face up. Great care must be exercised that the prints are not rubbed, or the surface touched by prints rubbing togther. The texture of this paper is somewhat rough, and if you slide the prints over each other the back of the upper print is liable to rub the face of the under print. Wash from one-half to one hour. They are then ready to mount or dry. If prints are not to be mounted they can be flattened and dried in the following manner:

557. **Flattening and Drying Unmounted Platinum Prints.**—First place the prints one by one on a large mounting glass, face side down. After all are on the glass, with the flat of the hand press the water from the prints; then lay a blotter over them and with a print roller expel all the excess water. *Do not roll too hard.* After surplus water has been mopped from the prints, pick them up one at a time and place a layer of prints face side down on a clear white, chemically pure photographic blotter. Place another blotter over these prints, then pass your hand or roller lightly over this blotter to absorb the excess moisture in the prints; remove this top blotter and cover prints with a white cardboard. The next layer of prints must be placed face up on the cardboard. Blot off the surplus water, remove the blotter and place on this print a fresh dry blotter. Follow this order with the remaining prints.

558. Another method for drying platinum prints, especially large sizes, is to hang the wet prints back to back on strong strings stretched across the room, using the

"Lockwood," or any spring clip that will grasp the edges of the print. If hung up at the end of the day they will be dry next morning. We recommend string in preference to wire, for the following reason: The wire in time will be affected by the different temperatures and becomes covered with rust, and when hanging up the prints the rust is apt to shake from the wire and settle on them, causing black spots.

559. **Retaining Brilliancy. Note.**—Platinum prints should not be allowed to remain in the various baths longer than is necessary, as they are likely to lose brilliancy from long soaking and the paper will also become soft, pulpy and hard to handle. When development is begun it should be completed without interruption, and as speedily as possible.

560. A good plan for the beginner is to develop the prints immediately after printing. If prints, however, are not to be developed at once after printing, place them in a tin tube, with a package of preservative, and seal the tube carefully. If the preservative were to come in contact with the surface of the paper it would cause white spots and streaks. This preservative is placed by the manufacturer in a small package which should never be broken.

561. The most important points in connection with the manipulation of platinum paper are as follows, and these should receive careful attention:

562. (a) Paper must be kept dry at all times.

563. (b) Placing paper on negatives, or examining prints, must be done in weak subdued day or gas light.

564. (c) The temperature of the developer has much to do with the final results.

565. (d) In developing, slide the print face up under the developer, so as to prevent the formation of air-bells. If any air-bells should form, break them at once by touching with the tips of the fingers.

566. (e) Prints must be placed directly from the developer into the acid clearing bath, without previous rinsing.

567. (f) Remember that the last clearing bath must be free from all yellowness. If this is so you can feel sure that your prints are cleared thoroughly.

568. (g) Remember that chemically pure hydrochloric acid (muriatic acid) must be used in the clearing bath. Never use commercial acid.

569. **Practice Work.**—The chief success of platinum printing lies in correct exposure. Of course, all negatives will not make good platinum prints, but prints from some negatives, which would ordinarily appear flat and dull if developed in the ordinary way, may be improved by manipulating in the developer. While the different grades of platinum paper work exactly alike, yet some produce more brilliant prints than others. Coarse papers are better suited to large negatives, while smooth papers are to be preferred for small negatives, so be guided accordingly. It is advisable for your first work to make a liberal number of prints using a medium rough paper, developed in normal bath prepared according to formula. After you have become somewhat familiar with the work, the three baths mentioned in the previous instruction should be prepared and each print developed in the bath suitable to the quality of the print to be developed. By a little dodging in the different developers, much improvement can be made over normal developing.

570. Your test prints should all be filed in your proof file with notes written on the back giving full information regarding the manipulation for the producing of the results. Should you meet with failures at first, by referring to the difficulty department you will undoubtedly find the cause, remedy and prevention thereof.

CHAPTER XXI.

Notes on Developing Platinum Prints—Black and White.

571. In order to produce uniform results from a variety of negatives, you should have three developing trays, each containing different developers, as follows:

572. In one tray prepare a normal temperature bath, in another a warmer bath; the former should not exceed 65 to 70° Fahr., with the latter from 80 to 90° Fahr.

573. **Bichromate Bath.**—The third should be a normal temperature bath, with not more than one dram of bichromate potash added to 40 ounces of developer. It is not necessary that this last bath be as large in bulk as the former. It is, however, advisable in the two former baths to use large bulks of solution, as more even results will be obtained.

574. **Method of Developing.**—All prints should be sorted before developing. Those printed from flat negatives should be separated from the contrasty ones; such prints which appear flat should be first dipped into the normal temperature or cold bath, and then immediately placed into the bichromate bath. If the prints are extremely flat place them directly into the bichromate bath. Too much bichromate will bleach the whites, the proper amount will restrain them.

575. Should you place a print which you judged to be very flat directly into the bichromate bath and find that it was bleaching, you can save the print by immediately transferring it to the warm bath. This is not recommended, however, for while a small amount of bichromate carried into either of the first two baths would do no harm, yet

if many prints are developed in this way you are quite apt to charge these baths with bichromate, thus in time causing normal prints which are developed completely in these baths to bleach, when it is not intended to clip the whites a particle. Therefore, exercise care in your judgment, and the safest plan would be, when in doubt as to whether print is exceedingly flat or not, to first place in in the normal temperature bath and then transfer immediately to the bichromate and complete the development in this bath. The flatter the print, the sooner you get it into the bichromate the better.

576. **Dodging in the Bichromate Bath.**—When printing from negatives which are quite soft and flat, for example, portraits where the hands or face are quite black and dark, these portions can be held back by first immersing in a cold bath, then immediately placing those portions which you wish to restrain in the bichromate bath, constantly shaking the print, so as to leave no decided line. When the print is restrained to the proper strength, immerse the entire print in the bichromate bath until completely developed. Very frequently one can save prints in this way which would be total failures if developed in straight developer.

577. **Life of Bichromate Bath.**—The bichromate bath will exhaust itself in a few weeks' time. It is always advisable to develop the prints which require the least restraining first. For prints requiring considerable clipping or restraining, if your bath is not strong enough in bichromate, add one-half dram of fresh bichromate. The bulk of the bath can be kept up by adding equal amounts of fresh water and bichromate thereto. It can be used continually by strengthening as instructed.

578. **Developing Contrasty Prints.**—Prints quite contrasty should be developed in the warm bath, as the warm developer softens the whites and warms the shadows, giving more even results.

579. **Bronzing in the Shadows.**—Where one is experiencing difficulty with bronzing shadows, which is prin-

cipally the case with contrasty negatives where the shadows are almost clear glass—and frequently during damp weather—the addition of an ounce of glycerine added to 80 ounces of developing bath will usually overcome the bronzing. As a bath containing glycerine decomposes rapidly, it should be used only where bronzing exists and ought not to be mixed with the regular bath. This bath will not produce good results after two or three weeks use. Discard it after employing that length of time and make up fresh bath.

580. Another method for removing bronze from prints is to apply glycerine to the bronzed portions on the dry print before immersing in the developer. Then place the print in the developer, watch it carefully, and if the shadows or bronzed portions are holding back, by gently rubbing over the bronze surface with the fingers while in the developer, these portions will develop more deeply. The former method, of adding glycerine to the bath, however, is more commendable.

581. **Using Developing Bath Continually.**—A developing bath can be used continually, but must be kept in proper condition. It must be of uniform strength at all times, and the same bulk of developer should be used. It is advisable to have a bottle containing fresh stock solution, from which the baths that are in use can be replenished. After using a bath once or twice, instead of adding 10 ounces of fresh solution, add 5 ounces of the fresh solution and 5 ounces of water. The object of adding water to this solution is that your bath is becoming charged with other chemicals liberated from the paper. The bath also evaporates and becomes more concentrated. Therefore, should you continually add fresh developer to this old or used bath, you would have a stronger bath than you started with.

582. Then again, a diluted bath does no harm, in fact one has better control over the developing of the print in a weaker bath, as there is more latitude for longer developing. Therefore, when replenishing the old bath always

use half water and half fresh developer. If the bath is used daily it should be filtered at least every two weeks. A bath like this can be used for many weeks, unless an immense amount of developing is done. About every six weeks, where baths are used daily, a fresh bath should be made up, consisting of one-third filtered old bath to two-thirds fresh bath, adding thereto the same quantity of water as old bath used. If the fresh bath develops too slow, add more thereto until the required speed is obtained. But remember, slow development is a good fault.

583. **Poisoning With Platinum Developer.**—Platinum solution is poisonous to some people, causing the hands to crack and become sore. A salve composed of the following ingredients applied to the hands will prevent poisoning:

Powdered Calomel.....2½ drs.
Balsam Fir.....½ oz.

Mix well, and add about 5 cents worth of vaseline. Apply freely to the parts affected.

Varnishing Platinum Prints.—Platinum prints which appear a little heavy and muddy in the shadows can be very much improved and made more transparent by immersing the prints (after they are thoroughly dried) in a bath of varnish. The Adamantine varnish, made by the American Aristotype Company, has proven very successful for this purpose. The ordinary white shellac varnish, obtainable at any paint store, also produces the desired results. When using the white shellac varnish, which is quite thick, reduce with equal quantity of alcohol, and in order that the varnish may dry rapidly add one drop of shellac drier to each ounce of solution. This solution should be well shaken before using.

Varnishing the Print.—Decant sufficient varnish into a tray slightly larger than the print to be varnished. Catch the corner of the print with a wooden photo clip and immerse by dipping the entire print under the solution, face side down, the same as you would when developing the print, drawing it through the solution. Then hold the print over the tray, allowing the surplus varnish to drain back into the dish; then hang up to dry. The varnishing of the print has a tendency to warming the tone, and for sepia prints either platinum or developing papers gives a very rich result. The prints should be varnished before trimming. To thoroughly dry the varnished print will require about fifteen minutes' time.

CHAPTER XXII.

Difficulties—Platinum Printing.

584. **Prints Developing Black, All Detail Lost.**—This is due entirely to over-printing—exposing too long.

585. **Image Developing Up Slowly and Very Faint.**—A certain sign that you did not expose long enough—under-printed.

586. **Removing Bronze from Shadows.**—At times you will find that paper will print very bronzy in the shadows. This generally occurs when printing from contrasty negatives with strong high lights, deep shadows showing almost clear glass. Printing in extremely damp weather also produces this difficulty.

587. Using a warm bath will generally remove all bronze from the shadows. Should it not, however, add one ounce of glycerine to the cold bath; beware of printing too deep, and develop long. Should bronze show in the prints after they have become dry, with a cotton flannel cloth apply a little crayon sauce to the bronzed portions. This will remove it.

588. **Streaks.**—This might be caused by uneven developing, not immersing the entire print with one sweep, or by dirt on the back of the negatives, or printing in direct sunlight through a window that is dirty, or by a shadow thrown from window sash on part of negative. Clean the backs of your negatives and use tissue paper or groundglass when printing in the sunlight.

589. **White Spots.**—These are frequently caused by particles of dirt on the negative, or dirt in the developer. The dirt settles on the prints, preventing the developer from acting. If the preservative becomes dry and particles of calcium were to settle on the prints, white spots and streaks would be the result. By dusting each print with a camel's hair brush before developing you will avoid many white spots.

590. **Yellow Prints After Third Acid Water.**—Caused by using poor quality of muriatic acid.

591. **Brown Tones.**—Brown tones are generally produced where the paper, negatives or atmosphere is quite damp. A developer too warm will also give brown tones.

592. **Rubbed Prints.**—Careless handling, allowing the prints to mat together; and in separating, drawing one over another. Washing in rough bottomed trays will account for this. When washing prints carefully lift them from each other—never draw them across other prints. Wash the prints face up. Use plenty of water and always handle them from the top and never draw them from the bottom.

593. **Printing in Damp Weather.**—Remember that the image will not appear as strongly in damp weather as it will in warm, dry, clear weather, although it is really printed darker. You must therefore allow for this and print considerably lighter under these conditions. Always develop the first print; let it be your guide for future printing.

594. **White Comets on Prints.**—May be caused by the calcium dust from the lump of preservative in the tube; also from lime that may fall from the ceiling while cutting the paper, trimming the prints or loading the printing frame, and from negatives that have been improperly washed after fixing; or, by particles of undissolved developing crystals. If a plate is not properly fixed or washed it frequently happens that hypo will form in small crystals on the surface of the negative. Sometimes these crystals will not show for months after the negative is made. Negatives should always be examined and dusted with a soft camel's-hair brush before being printed from.

595. **Weak Prints.**—This is sometimes caused by weak developer, exceedingly cold developer, or printing from weak negatives. Under-development will also cause weak prints.

596. **Wavy Markings.**—These will occur in prints if the developer is both weak and cold, or does not cover the print thoroughly during development. Always keep the print under the solution or spray the developer over the print with the hand.

597. **Spots Different Sizes and Shapes.**—This is usually due to particles of dust or dirt in the developer. Never allow the developer to stand in your developing tray or open dish for any length of time, as dust will collect on the surface and cause not only white spots, but also black spots on the prints. It should always be returned to the bottle at once after developing. You should also stir the developer after developing a print.

598. **Overcoming Dampness in Negatives and Backing Pads.**—On damp days re-dry negatives by holding over a gentle heat, also dry the backing pads and be careful not to expose paper too long to the moist conditions of atmosphere before placing in the printing frame. In damp weather prints should be developed immediately after printing.

599. **Black Comets and Brownish-Black Stains.**—These are

generally caused by mercury and are usually produced when printing from negatives that have been intensified. Great care should be taken that intensified negatives are thoroughly washed before setting up to dry. Keep the mercury solution away from platinum paper. Mercury spots have a brown color; iron spots have a black color.

600. **Note.**—A large majority of failures are due to carelessness in the manipulation and a general lack of cleanliness in every department. With clean rooms, tables, trays, and, above all, clean hands, one will experience little trouble in handling platinum paper. Black paper should be kept separate from sepia paper. It is always advisable when printing with both black and sepia paper to print black paper first, because if you print your sepia first there are liable to be particles of mercury on the negative that come from the sepia paper. It is also advisable, in case you print sepia paper from a negative before you print black, after you are through printing to wipe the negative with a piece of cotton; especially so if the negative has been varnished, as particles of dust stick to varnish more than to film.

CHAPTER XXIII.

Platinum Paper—Sepia.

601. With a few exceptions Sepia Platinum paper is manipulated the same as black. The paper is supplied in the same grades, the principal difference being in the printing and developing.

602. The Sepia paper manufactured by the Willis & Clements people, requires special developing salts for best results, and the bath must be hot for developing.

603. Where the special sepia solution is employed one may use the regular developing salts intended for black paper, heating the bath to 150° Fahr. The regular sepia developing salts, however, are recommended for best results.

604. The Angelo Sepia paper is a cold development paper. While special salts are required, the developer is used cold.

605. The above are the two principal papers used, and while there are other sepia platinum papers manufactured, some of them giving very pleasing results, yet all are manipulated practically in the same manner.

606. **Care of Sepia Paper.**—Sepia paper is more easily affected by light than the black; therefore, greater care must be exercised in handling this paper, especially during printing.

607. **Quality of Negatives Required.**—Sepia papers require a thin, snappy negative. A negative hard and contrasty will *not* make good sepia prints. On the other hand, a flat negative will give muddy prints. An ideal negative for sepia prints is snappy, but not hard, full of detail and delicate catch lights.

608. **Printing.**—Print about one shade lighter than for black paper. Do not tint the whites. The safest method to employ would be to make a print and develop, fix and dry it. This will give you a line on the required depth of printing. Remember that sepia prints usually dry up two shades darker than they appear when wet. A print may look weak while wet, yet when thoroughly dry may be just right.

609. **Margin Printing.**—Platinum prints, especially when made on the heavy grades of paper, are usually printed with a margin. For a 5x7 negative an 8x10 or 10x12 sheet of paper is usually used. The negative is blocked with an opaque paper cut-out, while the printing is done in a large frame. Some pretty effects are produced by printing a border of one or more tints in the margin. For instruction see "Dodging in Printing."

610. **Developer.**—The developing salts are put up in crystal form, in different size packages, the smallest of which will make a 16 oz. solution, the largest 64 oz., or one-half gallon. These salts must be dissolved in hot water, the entire package being dissolved at one time. Complete instruction for dissolving accompanies each package. These instructions should be followed to the letter.

611. **Developing.**—For Willis & Clements Sepia paper the developer must be used hot, about 150 to 180° Fahr. The higher the temperature of the bath the warmer the tone, and the more crispness will be obtained.

612. A good way to keep your developer hot is to place the developing tray on a gas or oil stove. The tray, of course, must be either porcelain or agate ware to stand the heat. Regulate the heat so it will keep the solution on the point of steaming, without boiling, during developing, and as hot as the hands can bear. Use plenty of solution. The heat will cause you to handle the prints quickly.

613. **Developing Sepia Prints.**—Catching the corners of the print between the thumb and first finger of both hands, and with the face side up, slide the print under the solution and with a quick motion draw the print through

the bath. See that the developer is over all the print at the first dip. After passing the print through the hot developer you can hold the print in the hand to complete developing, but it must be held perfectly flat otherwise you will have uneven developing. Should the print be a trifle light, again immerse in the bath allowing it to remain for a few minutes, and it will grow considerably darker.

614. **Developing With Wood Photo Clips.**—Where one's fingers are very sensitive to the hot bath, an ordinary wooden photo clip can be employed. Attach this clip to the corner of the paper, draw it through the bath; allow the print to remain in this bath and with the photo clip constantly shake so as to avoid the sediment settling on it. Allow the print to remain in the bath until completely developed.

615. **Special Sepia Solution.**—Should the tone of the print from this bath be too cold and warmer tones be desired, add 1 dram of special sepia solution to each ounce of sepia developer. This W. C. sepia solution can be procured from any photo supply dealer. It will brighten (clear up) the whites and add to the sepia tone. The more of this sepia solution you add the warmer tones you will produce.

616. As this solution has a tendency to purify the whites, it is a good plan, if you have very flat prints from a weak negative, to develop in a bath to which has been added sepia solution. Should you have a hard negative where the contrasts are great, it will not be well to develop resulting prints in a bath where the sepia solution has been added, as you would thereby produce too much contrast. Better results will be obtained by developing with your regular sepia developer, omitting the extra sepia solution.

617. **Caution. Special Sepia Solution.**—Where satisfactory prints can be produced by using the regular sepia developer, it is advisable to omit the special sepia solution. The only object of this sepia solution is to purify the whites. It does give more contrast to the print, but where nega-

tives are made with sufficient contrast it is better that the sepia solution be omitted.

618. **Preparing Clearing Bath.**

Water.....120 ozs.
Hydrochloric C. P. (Muriatic) Acid.....1 oz.

619. You will notice this bath is not as strong as the one used for black and white. The reason is that sepia paper is likely to bleach if fixed in too strong an acid bath. Exercise care in preparing the clearing bath. Do not make it stronger than proportions recommended above and place prints into it directly from the developer.

620. **Clearing.**—Sepia paper, being more sensitive to the light than the black, may be affected by the light when in the acid bath. Therefore in the first acid bath they should be placed face down. As the highlights may become tinted it is, therefore, a good plan when clearing the prints in the remaining baths to use gas or lamp light, or at least subdued daylight. There is also danger of damaging prints by allowing them to remain too long in the acid baths. Give sepia prints three changes of acid clearing and then wash exactly the same as for black and white prints. Sepia prints should not be allowed to lag in the various manipulations, as they lose brilliancy by long soaking. They should be handled as rapidly as possible through all the baths and dried between blotters.

621. **Angelo Sepia Paper.**—While "Angelo" sepia paper is a cold developing paper, the printing and all other manipulations up to the development are exactly like "W. C." The developing salts must be dissolved in hot water, but after doing so the developer should be allowed to stand until cool. Filter before using. The print is developed exactly like the black paper. If warmer tones are desired, add to regular sepia developer some of the special "Angelo" sepia solution supplied by the manufacturer. The amount of sepia solution added regulates the warmth of tone. If thick paper is used you must leave it

longer in the developer. It is better to first print a little under than over, as with "Angelo" paper the longer you leave the print in the developer the better the deposit of chemicals on the print. Therefore, prints not printed too far, will stand long developing and improve in quality.

622. **Clearing Bath.**—The clearing, or fixing, of "Angelo" paper is exactly the same as for W. C. except for the use of a weaker acid bath. The acid bath for "Angelo" paper should not be stronger than 2 drams acid to 80 ozs. water. Be sure and do not carry any of the acid bath into the developing bath on your fingers, as the acid will not only retard the developing, but in time bleach the highlights.

623. **Note. Keeping the Developer.**—The sepia developing bath, after use, must be kept in the dark. A safe precaution is to wrap the bottle containing the bath with black opaque paper and label "Sepia Cold Developer." The sepia bath must not be used for black prints.

624. **Constant Use of Sepia Developer.**—Sepia developer can be used over and over as long as it gives good results. Should the sepia bath evaporate the crystals, they may be re-dissolved by adding water, restoring the bath to its original quality. Too much special sepia solution will produce bleached prints. Over worked sepia bath will also give bleached prints. Leaving too long in the acid bath, or in acid too strong will give bleached prints.

625. **Caution.**—To avoid exposure to light, greater care must be exercised when developing and examining sepia than black and white paper. As it is more sensitive to light than the black, if exposed too long the whites will become discolored. Keep prints, while in the developer and acid trays, in subdued light. Discoloration of the whites is generally due to one or all of the following causes: First, exposing to light too strong while developing. Second, using a developing dish in which the enamel is cracked or chipped, exposing the iron. Third, old paper. Fourth, exposing prints while clearing to strong light. It is advisable to do your developing in very subdued light

626. **Saving Platinum Waste.**—As considerable plat-

inum remains in the print after developing, it is eliminated in the first acid water. By saving these acid baths one may reclaim a large amount of the platinum by adopting the following method:

627. Suspend in a 20 gallon jar four pounds of scrap zinc. Pour your first acid washing and all rejected developer into this jar. As the jar fills decant the clear water from time to time. Where much sepia paper is used, being in excess of the black paper, it may require the addition of a little muriatic acid to the solution to make it sufficiently acid to clear the bath from yellow to white. When the zinc is entirely eaten away, to reclaim all of the platinum, new zinc must be added. As long as zinc remains in this jar it will continue to throw down all added platinum. About once a year the sediment should be gathered, packed and sent to the refiner.

628. **Warmer Sepia Produced by Toning With Nitrate of Uranium.**—Sepia tones, even to a dark red, can be made on any black platinum paper by treating it after development in a special sepia toning bath. Print to the same depth as for black tones; develop and clear them thoroughly and wash in the usual way.

629. **Preparing Uranium Sepia Toning Bath.**

Water	12 ozs.
Nitrate of Uranium	60 grs.
Ferricyanide of Potassium (Red Prussiate of Potash)	42 grs.
Sulphite of Soda Crystals	18 grs.
Acetic Acid	6 drops

630. Place this in a bottle labeled "Uranium Sepia Toning Bath." The more acid used in the bath the warmer will be the resulting tone.

631. **Toning.**—The prints having been previously developed, cleared and washed are ready for toning. Place them into the toning bath one at a time, allowing them to remain until the desired color has been produced. This bath should be used at a normal temperature—about 60°

to 70° Fahr. The first change will be to a purple-brown, the next stage brown, and then by prolonged toning they will run into red. Prints should be handled over and over during toning, to produce even tones. After the prints are thoroughly toned, wash by hand for 15 minutes, drying in the usual manner.

632. **Caution.**—The tray used for this toning bath must be used for no other purpose and must be kept perfectly clean. The above toning bath is not recommended for permanency or evenness, but for the extremely odd and striking color effects which may be produced through its use.

633. **Sepia Tones Produced With Bichloride of Mercury.**—Still another toning bath is called "mercury toning." While we do not recommend mercury toning on account of lack of permanency—the prints generally returning to the black tone in time—yet some very beautiful effects can be produced, using bichloride of mercury as the toning agent. You must be cautious never to use mercury toning trays for other purposes. If you do an endless amount of trouble will be met with. Should the least particle of mercury be carried to any trays used for black platinum prints you would have trouble with all kinds of spots. For this reason when using mercury do so with the utmost care. Keep the solutions and trays isolated from other work.

634. **Mercury Sepia Developing and Toning Bath.**—

STOCK SOLUTION.

Water	8 ozs.
Bichloride of Mercury C. P	1 oz.

635. Place in a 10-oz. bottle and label it "Mercury Solution." Also mark in strong black letters "POISON," as taken internally its effect is deadly. To 50 ounces of regular platinum developer, used for black tones, add one ounce of this mercury stock solution.

636. **Toning.**—Print exactly the same as for black

tones, develop the print in the mercury developer until the desired tone has been reached and then place in the acid clearing bath made one-third as strong as for black tones. After fixing, wash thoroughly and dry in the usual manner. If tones secured by this bath are not as warm as desired, the addition of more mercury will result in warmer effects.

637. As before stated, we do not recommend the two latter methods for obtaining sepia tones. We have given this formula for the benefit of those who like the effects which can be produced by this method. But, for good, permanent, even tones, the regular prepared sepia papers are the best.

638. **Practice Work.**—For first experiments with sepia prints on platinum paper, prepare the bath ready for use, before making prints. Judging the print for sepia is similar to judging for black, except that the printing is not carried quite so deep for the sepia, as it dries from one to two shades darker when finished.

639. It is advisable to make but one print at a time, developing each immediately after printing, and observing carefully the gradation. Allow the image to fully develop. If not over-printed it will not be too dark. It is not advisable to make more than two or three prints, before drying. Note how they dry before making more prints. Your first efforts will serve as a guide for future work. In all cases, for experimental purposes with platinum paper, it is advisable to use the medium rough grade of paper. You can better judge results with this grade than with either of the extremes—extra rough or very smooth.

640. Should you experience trouble in the manipulation, refer to the difficulty department. Read carefully and you will surely find the cause, prevention and remedy for the trouble. Preserve first efforts, whether good or bad, because it is really an advantage to meet with some failure at the start, as you then have an invaluable guide for future endeavors. In any event, make careful notes on all test prints and file them in the proof file for future reference.

CHAPTER XXIV.

Developing or Gaslight Papers.

Introduction.

641. **Introduction.**—Developing paper, more commonly called gaslight paper, is a paper which can be printed by light of any kind and from negatives of all descriptions. The image is not visible after exposure to the printing light, being seen only after the developer is applied. The most marked difference between this class of printing papers and printing-out papers is in sensitiveness. So sensitive is the gaslight paper that it cannot be handled safely in daylight, nor should it be unduly exposed even in ordinary lamp light. The entire process of manipulating developing papers is quite simple, but like all other photographic processes it requires some skill and judgment, both of which are readily acquired by careful observation of each detail and by close adherence to the rules given herein.

642. The developing paper process is one of the most convenient methods of finishing prints. Pictures may be produced with it regardless of weather conditions. Neither cloudiness, dampness, or any other deterring feature need be considered. The photographic worker is entirely independent in this respect, being able to finish prints either day or night. For the professional photographer this process simplifies work enormously, as the printer is able to take one negative at a time and print the complete order. This makes it possible to give precedence to rush orders and make complete delivery of the order when promised.

Further than this, each and every order can be completed and ready for delivery without delay.

643. It is not necessary for the amateur to go into a closed dark room, as it is possible to print work at night, which may be done on kitchen or dining-room table, in comfort. An ordinary electric, gas, or lamp light, can be used for printing. After printing, the paper may be developed but a few feet from the light, by simply interposing between the light and developing trays a piece of heavy cardboard, or similar material.

644. In no other department has the photographer such a range of choice as with developing papers. They are made in many different grades and surfaces, which make it possible to obtain good prints from practically any kind of a negative, by using proper judgment in the selection of the particular paper best suited to the negative in question.

645. **Brands of Paper.**—So rapidly has the popularity of this process developed, that there are now on the market a great variety of brands of developing papers. Among the most popular are "Velox," "Argo," Artura" and "Cyko," each particular brand having its various grades and surfaces. Every brand of paper has its own peculiar qualities, yet the particular brand for your use is not of serious importance. However, the grade and surface must be taken into consideration when making the first experiment.

646. **Grades of Paper.**—Most of the gaslight papers tend to increase contrast, being especially suitable for thin, flat negatives. Practically all developing papers are divided into two general classes—hard and soft. The *hard* grade is intended for flat negatives, as it works with a great amount of contrast. It should not be used with hard, contrasty negatives.

647. The *soft* grade is best suited to negatives of strong contrast, giving the best results when soft effects are desired.

648. All manufacturers do not use the terms "hard" and "soft," but the *hard* grade is generally termed "Regu-

lar," or "Carbon," while the *soft* is "Special," or "Portrait."

649. **Choice of Paper.**—The majority of persons being initiated into the art of photography as a rule lean toward the selection of glossy surface paper. Only after the artistic taste has been cultivated does the inevitable revolution against the glossy surface set in. We do not question the fact that glossy prints on printing-out paper give most pleasing results, on account of warm tone, but it must be admitted that with developing papers it is different—the black and white image appearing much more rich on a matte surface. Not only is this true, but the glossy gaslight papers are not as easy to manipulate. At times they have an objectionable tendency to yield surface marks, which afterward have to be removed. On the other hand, the very rough papers require special care, and should not be used when making first trials. The best grades and surfaces to employ are those which have a tendency to increase the contrast, and at the same time give a smooth matte surface. Therefore, the first work should be made on a paper like "Velox" Regular Carbon, "Argo" Carbon Matte, "Cyko" Contrast Matte, "Artura" Carbon Black Matte.

650. **Caution.**—It is necessary to caution the beginner at the very outset of his work not to be discouraged by apparent failure in early stages of the work. Study this instruction not only once, but go through it thoroughly two or three times, as the cause for any failure will probably be that some point which is essential to complete success has been overlooked.

CHAPTER XXV.

Velox Printing and Developing.

Introduction.

651. **Surfaces and Grades.**—Velox papers are divided into two grades called "regular" and "special." These terms have reference only to speed and contrast, but not to surface. They could as well be referred to as "slow" and "fast" papers, or "hard" and "soft." Each grade contains a variety of surfaces which adapt the paper to all kinds of work and to negatives of various qualities.

652. **Regular Papers.**—Regular papers are adapted for negatives lacking contrast, known as thin or weak negatives. These papers print slowly, but develop quickly. The Regular Carbon has a matte surface, while the Regular Velvet possesses a semi-gloss surface, intended for prints resembling platino or other matte surface printing-out papers. The Regular Glossy is intended for fine detail work, and is particularly adapted to the requirements of the commercial photographer.

653. **Special Papers**—Special papers are intended for use with contrasty negatives. Such negatives are also referred to as being strong, thick, dense or hard. The emulsion of the *special* papers is *more sensitive* and requires *shorter* exposure and *longer* development than the *regular* papers. The *special* papers *reduce* the contrast on *hard* negatives and give *soft* effects with fine detail. The Special Carbon has exactly the same surface as the Regular Carbon, but is intended for hard negatives. It therefore has the "special"

printing qualities. This paper should be used for the same class of negatives as Special Portrait, but remember that the Special Carbon has a peculiar carbon tint of its own. Special Portrait has a half matte surface and should be used for the general run of average negatives, having plenty of contrast and good detail.

654. The Special Velox is particularly adapted for portrait work. The Special Rough paper is particularly adapted to large portrait heads, artistic landscape studies, and for such negatives as would ordinarily be used for rough platinum paper it will give almost identical results. Special Glossy is the same as Regular Glossy, as far as surface is concerned, but must be used for printing from strong negatives, as it will give fine detail. A negative that would yield good prints on the *special* paper would give an extremely contrasty kind on regular paper.

655. **Royal Velox.**—Royal Velox differs from other Velox papers in that it is coated on a stock having a cream tint—a soft, mellow tone that prevents harshness in the highlights. In fact it is somewhat heavier than the usual Velox stock—about half way between the single and the double weight. Royal Velox prints are delightful when re-developed for sepia tones. See instruction for re-developing. Royal Velox papers are furnished in both regular and special grades to suit negatives of various degrees of strength, just as the ordinary Velox papers are supplied.

656. **Note.**—Negatives that will produce good results with any printing-out papers should be printed on the Special. Regular Velox papers are specially adapted to negatives which are *too soft* for other photographic papers. To those familiar with Velox paper it is an easy matter to select the grade best suited for the results desired. The beginner should be guided by these instructions and not allow the advice of others to mislead in the selection of the wrong grade, as failure to secure the results expected will be improperly charged against the paper, when it belongs to defective judgment.

657. The following table of grades and weights of

Velox will be an aid to those contemplating using this paper:

Surfaces, Weights and Grades of Velox.

Grade.	Surface.	Speed.	Color of Label.
*Velvet Velox	Semi-Gloss	Special	Slate
*Velvet Velox	Semi-Gloss	Regular	Brown
*Portrait Velox	Smooth Matte	Special	Red
*Carbon Velox	Matte	Regular	Yellow
Carbon Velox	Matte	Special	Orange
*Rough Velox	Matte	Special	Purple
*Glossy Velox	Enameled	Regular	Green
*Glossy Velox	Enameled	Special	Blue
Royal Velox	Matte	Regular	
Royal Velox	Matte	Special	

658. *Furnished also in Double Weight Velox; double weight papers require no mount, and when printed under a mask, which will insure a white margin, present an exceedingly artistic effect.

659. **The Necessary Outfit for Printing and Developing Velox Papers.**—The size of trays to be used in the manipulation of Velox papers is immaterial, so long as they are large enough to hold the prints. In the following outfit is included the smallest size trays that should be used for 5 x 7 or smaller prints. The trays must be made of some substance which the chemicals will not affect. Never use iron trays, or trays made of material that will rust:

1 5 x 8 tray for developing.
1 5 x 8 tray for intermediate washing.
1 5 x 8 tray for fixing bath.
1 5 x 8 tray (or larger) for final washing.
1 5 x 7 printing frame (or frame for size of negative used).
1 8 oz. graduate.
1 1 oz. graduate.
1 Glass stirring rod.
1 Hydrometer.
1 Camel's-hair brush.

660. It is a good plan to either letter or number each of the trays, so there will be no danger of mistakes.

661. **Chemicals Required.**—Metol or ortol, hydroquinone, bromide of potassium, acetic acid No. 8, sulphite of soda, thiosulphate of soda (hypo), sodium carbonate, alum. One ounce for each of the first four chemicals will be sufficient, while one pound of each of the sodas and alum should be procured.

CHAPTER XXVI.

Velox Printing and Developing.

Brief General Instruction.

662. **Printing.**—A good rule to follow is to sort your negatives. When about to print from them, print the heavy ones first, using Special Portrait Velox; then for thinner plates use "Carbon" or "Regular."

663. When making exposure be sure to cover the box containing the paper, as it is very sensitive to light, which makes it an easy matter to ruin an entire box of paper, by allowing the box to remain uncovered during a single exposure.

664. **Proper Light for Developing.**—While developing papers are not nearly as sensitive to actinic or white light, as dry plates, it is still necessary that a certain amount of precaution be taken. A strong yellow light, or dim lamp light is perfectly safe, providing it does not strike directly on the paper. There is absolutely no need for developing by a dark room lamp. Always load the printing frame and develop in the same degree of light.

665. **Printing Light.**—While it is perfectly practical to make prints by the use of daylight, it is preferable to use artificial light—a candle, kerosene lamp, or electricity. Artificial light is more steady and even than daylight. Daylight at 12 o'clock noon is, of course, much stronger that at 4 o'clock in the afternoon. Therefore, it makes a vital difference as to the length of exposure, while with artificial light the duration of exposure remains practically the same at all times.

666. **Exposure.**—Length of exposure depends, of course, on the density of the plate and the distance between the negatives and the light. For example: When printing from a medium strength negative, the exposure should be eight seconds under a 16 candle-power incandescent light, at a distance of twelve inches from the light. If the negative is placed at a greater distance from the light, the time of exposure will increase proportionately, according to the following ratio: A soft negative which prints in four seconds, at twelve inches distance, will require sixteen seconds at twenty-four inches distance.

667. Although Velox paper can be developed with solution made from the contents of prepared tubes, which simply requires the addition of water to the powders (the developing solution put up by manufacturers is good), yet the preparing of your own developers will prove extremely advantageous. You may use the formula which accompanies each package of paper, or the following will be found to give good results:

668. **Metol-Hydroquinone Developer.**

Water	24 ozs.
Metol	15 grs.
Sulphite of Soda (Anhydrous)	3 drs.
Hydroquinone	1 dr.
Bromide of Potassium	4 grs.
Carbonate of Soda (Anhydrous)	5 drs.

If soda crystals are used double the above quantity will be required.

669. Dissolve the chemicals in the order indicated in the formula. For use, dilute with an equal amount of water.

670. Remember *hydroquinone* gives *contrast; metol* gives *detail*, even to flatness, so if, with the correct exposure, your results are flat, the addition of a trifle more hydroquinone will give more contrast.

671. When once the correct exposure necessary for the

negative you are printing from is ascertained, it is a good plan to write on the back of the negative the number of seconds required to print. Thus, if you have occasion to again print from this plate, you will know the exact exposure without experimenting.

672. Where dense negatives are to be printed from, it is best to use your developer almost full strength and employ Special Portrait Velox paper. It is well to print from heavy negatives first and when you come to the thin plates dilute the developer one-half with water and use Carbon Velox. The more dilution, the more contrast can be produced; but avoid the extreme, as there will be danger of running into olive or green tones.

673. The addition of a few drops of a ten per cent. (10%) solution of bromide of potassium will aid in obtaining contrast. If the prints do not develop clear, bromide should be added until they do. Care must be taken not to add too much bromide, because green or olive will be produced, and to remedy it, more developing solution will have to be added, or a new bath prepared.

674. Add but a drop of bromide at a time, or the green tones produced will necessitate more tampering with the bath.

675. It is well to place prints in an acid clearing bath before fixing. This bath will prevent mealiness and muddiness on the surface of print. Make clearing bath as follows: To two quarts of water add four drops acetic acid. Allow prints to remain in this bath one minute, then place in the fixing bath for at least twenty minutes.

676. For the fixing bath use the following:

ACID HYPO FIXING BATH.

Dissolve:

Water .....64 ozs.

Hypo .....16 ozs.

677. When thoroughly dissolved add the following hardening solution, dissolving the chemicals separately and in the order named:

Water	5 ozs.
Sulphite of Soda (Desiccated)	½ oz.
Acetic Acid No. 8	3 ozs.
Powdered Alum	1 oz.

Note.—Should prints bleach in this hypo bath make up a new solution, using half the amount of acetic acid.

678. **Testing Exposure.**—Use small strips of Velox paper to test and experiment with. After you secure the proper tone and everything is working well, proceed to make your prints. You can use the developer over and over again, by adding a little more fresh stock to keep up the bulk of bath.

679. **Caution.**—It is essential that the hands be perfectly clean and dry when handling Velox, or any printing paper. They must also be thoroughly cleansed before developing, and never attempt to develop paper after having had your hands in the hypo, but wash them thoroughly, removing every trace of hypo from the hands. In order to save placing the hands in the hypo bath after developing each print and the necessity of washing the hands thoroughly before developing a second print, slide the print under the solution and with a wooden paddle keep your prints moving in the hypo for a few seconds. They should never be allowed to remain packed together, but, on the contrary, must be kept separated. After fixing, the prints must be carefully washed and separated by hand. Handling over for half an hour in several changes of water will be sufficient. After prints are washed blot them off with royal blotters; then lay them out on dry blotters, face side up, to dry, unless you desire to mount them at once.

680. **Trimming Prints While Wet.**—Any print you desire to mount at once may be trimmed wet. This can be done very conveniently. Take a square piece of glass, wet it and place your print on the glass, face side down; turn the glass over, and your print is now on the under side, face up. Slide it to the edge and square it to the glass,

then trim the edges with a pair of large shears. After each print is trimmed, place it back in the tray of water until all are trimmed. Then lay the mount on a large glass plate, face side down, one print overlapping the other a trifle, until all are on the plate. Mop off the excess water by placing a blotter over the prints and run over it with a print roller until all surface water is removed. Paste the backs of prints with ordinary starch or prepared paste and mount in the usual way.

CHAPTER XXVII.

Velox Printing and Developing.

Detailed Instruction.

681. **Proper Light for Developing.**—While gaslight papers are not nearly as sensitive to actinic or white light as dry plates, still it is necessary that a certain amount of precaution be exercised. A very strong yellow light or a dim lamp light is perfectly safe, providing the direct rays from the light do not strike the sensitive paper. It is not necessary to develop by a dark room (ruby) lamp. The printing frame may be loaded and the development carried on in the same light.

682. **Disposition of Outfit, Management of Light, Etc.**—To insure perfect results the place where you intend working should be far enough from the source of light to prevent the possibility of the paper becoming fogged. Six to eight feet from an ordinary lamp or gas jet is far enough, or if the space is limited work nearer to the source of light, interposing a piece of cardboard between the light and the place where you are developing and loading the plate holder. The safety of your position can easily be determined by taking a small strip of the paper, covering a part of it and exposing the remainder for about 30 seconds in the light in which you intend working. If upon development there is a difference between the exposed and the unexposed portions of the strip, the light is too strong, and you should either move farther away or shade your light more.

683. **Printing Light.**—For exposure, artificial light is preferable to daylight, because it varies less in strength. When you have obtained the proper distance and time of exposure on a test print from a given negative, it is easier to make the remaining prints from the same negative of uniform quality.

684. **Length of Exposure.**—If a kerosene lamp is used for printing we would advise the placing of a piece of camphor about the size of a walnut in the oil. This will have a tendency to make your light of a whiter color and naturally its strength will be greatly increased. With a kerosene lamp you can place your negative, while printing, quite close to the lamp, but keep it revolving and moving so that the light will be distributed evenly over the entire negative. If there are parts of the negative that print slower expose longer on these parts, holding them closer to the light. As a general thing the frame placed about 10 or 12 inches from the light gives the best result.

685. The length of exposure is naturally governed by the strength of negative and the kind of light employed. If a 32 candle-power incandescent light is used with a fairly good negative, from 6 to 8 seconds exposure will be plenty if the negative is held about 10 inches from the light. A thin or soft negative would probably print in 4 seconds. The same negative held 20 inches from the light would probably take 16 seconds. One advantage of holding the negative at least 10 inches from the light is that the light is more evenly distributed. If held very close to the light there is danger of printing one part of the negative more than the other, thereby producing an uneven print. The length of exposure during printing depends entirely on the density of the negative and the strength of the light employed.

686. To find the proper distance from the light at which the negative should be placed during printing, take a piece of white cardboard, actual size of negative to be printed from, and move to and from the light until you find the shortest distance at which the entire card is evenly il-

luminated. You will find that the *regular* papers will need from four to five times more exposure than the *specials*, if the negative is placed at the same distance from the light.

687. The following table will give you a slight idea of exposure, but only practice and close observance of your results can teach you the exact exposure: With special papers, and size of negative 4 x 5, or smaller, held 7 inches from the light of a kerosene lamp, it will require about 30 seconds; Welsbach Burner, 10 seconds; 16 candle-power electric light, 20 seconds; 32 candle-power, 10 seconds; ordinary oil lamps, from 30 to 50 seconds. Regular Carbon papers, 7 inches from the light, with a kerosene lamp, will require about 1½ minutes to print; Welsbach Burner, 40 seconds; 16 candle-power electric light, 50 seconds; 32 candle-power, 40 seconds; average oil lamp, anywhere from 2 to 3 minutes. If a 4-foot gas burner is used, give the same exposure as with a 16 candle-power electric light. If a 6-foot gas burner is used, give the same exposure as used for the 32 candle-power.

688. A good rule to follow is to first sort the negatives. Place your strong negatives in one pile, the thin ones in another, and when about to print from the heavy ones use the special papers of any surface you prefer. In printing from the thinner negatives use the carbon, or regular paper. While making the exposure be sure that the box containing paper or exposed prints is covered. Being quite sensitive to light, it is easy to ruin an entire box of paper by allowing it to remain uncovered during a single exposure.

689. **Printing With Electric Light.**—For studio work and where a large amount of printing is done, a 32 candle-power incandescent electric bulb, which can be arranged along the lines of illustration No. 9, is recommended. This illustration represents one end of a dark room, fitted with a sink, over which is arranged a developing light. About five feet from the sink along one end of the room is the printing light. This light is mounted on a pine board attached to the edge of a shelf, 12 inches wide. On the lower

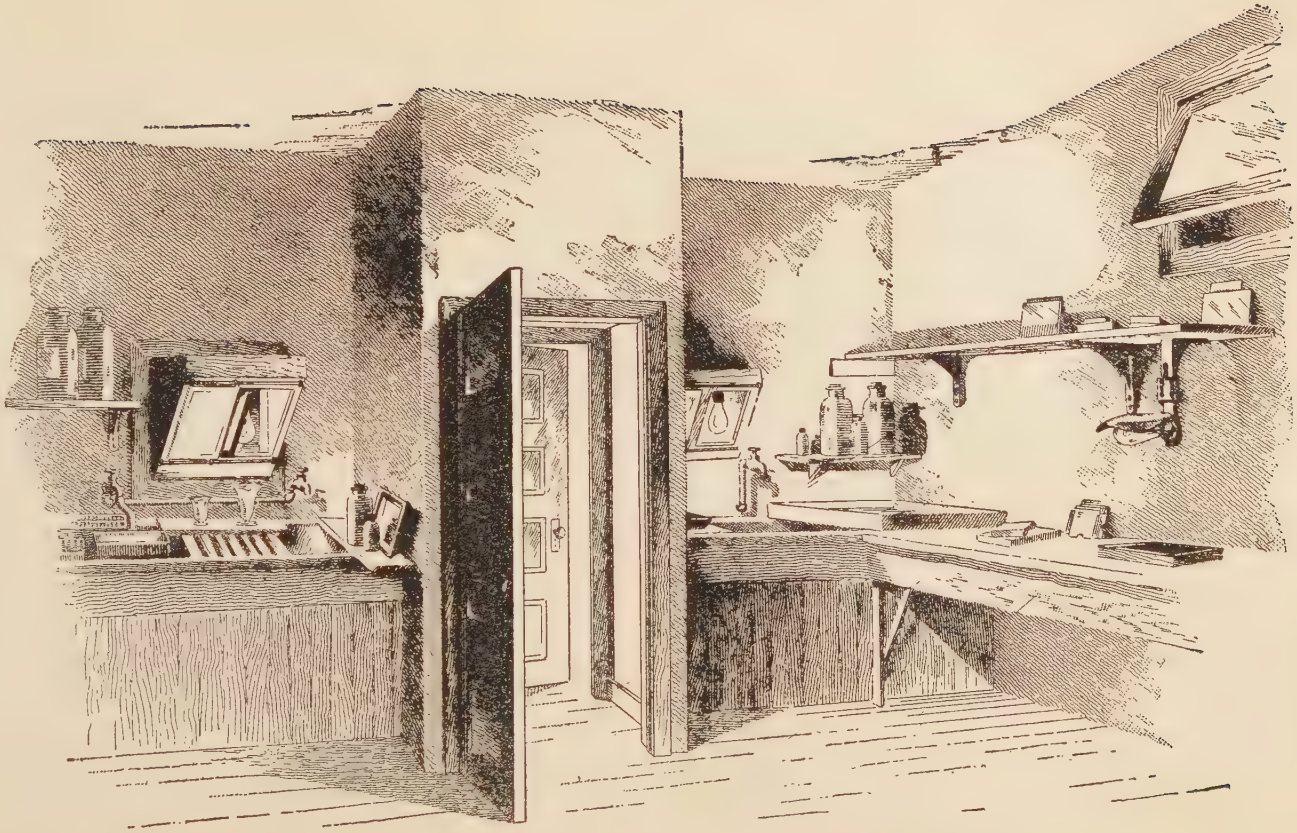


Illustration No. 9—See Paragraph No. 689
Section of Dark Room Equipped for Printing and Developing Gaslight Papers

edge of this board is a socket, into which is screwed a 32 candle-power incandescent bulb. The light is operated by a lever switch attached to the upper end of the board and within easy reach of the printer. This switch can be encased in a box with a slot cut on the top, and a door attached to the front, running the depth of the box. By allowing the handle of the switch to extend through the opening, the light may be turned off or on at will, without opening the door of the box. This box also prevents the possibility of getting an electric shock by taking hold of the switch except by the handle.

690. The light is arranged about 18 inches from the table, with a tin reflecting hood over it. This concentrates all the light, throwing it downward upon the printing frame. An important convenience of this printing light is the advantage one has of being able to dodge in the printing by holding the frame at any desired angle. By placing the box a certain distance from the light the printing may be done by laying the frame flat upon it. By means of the switch the current is turned off after each exposure, which effects a saving on electric light bills.

691. The developing light, which is a 16 candle-power incandescent, is encased in a bevel-shaped box, having a glass front, covered with one sheet of yellow post office paper. The bevel-shaped box permits the light to fall upon the print in the developer. It also supplies sufficient illumination to the room to permit loading the printing frame. By means of the cardboard partition between the printing and developing light, the developing and loading of the frame can be carried on while the paper is printing under the printing light, as one light will not interfere with the other.

692. The essential point is to provide for some simple way for *uniformity of exposure to the light,* as the slightest variation in the position of the printing frame in its relation to the light will make a difference in the time of exposure required for the best results. It is essential to have a perfectly even illumination over the entire surface of the nega-

tive. In order to ascertain whether the light is evenly diffused at the point selected for exposure, take a piece of white cardboard the size of the printing frame. Hold it parallel to the source of light, moving it backward and forward over the box until you determine the location of the part where the illumination seems most even. Allow this to be the printing point. A good general rule is to measure the negative from corner to corner, diagonally, making that the distance for the first test. In most cases it will be a correct guide for printing.

693. **Test for Exposure.**—When opening a package of paper, avoid exposing it to bright light (as previously suggested). If uncertain which side has the sensitized surface, determine which side of the paper shows a tendency to appear concave. This will be the sensitive surface, as the paper curls slightly toward the coated side. When ready to make the first exposure, cut a sheet of paper into small strips, about one inch wide. Place one of the strips over an important part of the negative and make an exposure, using your best judgment as to the distance from the light, and time of exposure. Develop the print and if it is not satisfactory try another strip, varying the time or distance as indicated by the first trial. When the best possible results are secured from the negative in question, proceed to make the desired number of prints from the same negative, giving the same exposure. If time and distance are identical all the prints should be equally good. By comparing other negatives with the one printed from, you will be able to make a fairly accurate estimate of the exposure necessary for each. If care is exercised good results should surely follow in every case.

Nature of Chemicals Used for Developing and Fixing.

694. **Metol.**—A whitish powder, soluble in water. Is a developing agent, producing detail even to flatness.

695. **Sulphite of Soda.**—Transparent crystals, also granular and dried (anhydrous). Soluble in water. Two

parts of crystals are equivalent to one part dried or anhydrous. Chemical action—neutral, or slightly alkali. Controls tone of the print. Do not confuse sulphite with sulphate of soda.

696. **Hydroquinone.**—Nearly white, or pale yellowish needle-like crystals. Must be protected from light and dampness; otherwise it will discolor. Soluble in water. Is a developing agent and produces contrast.

697. **Bromide of Potassium.**—Colorless crystals. Dissolves readily in water and is a restraining agent.

698. **Carbonate of Soda.**—Dried, anhydrous crystals. (See Glossary.) Is extremely soluble in water. Action, alkali. Its action in developing—opens pores of the emulsion in the paper so that the developing agent may act.

699. **Hyposulphite of Soda.**—Put up in crystals and granular form. Colorless. Chemical action, found both neutral and acid.

700. **Alum.**—Colorless crystals; also put up in powder form. Chemical action, acid. Dissolves slowly in water. Possesses qualities that harden the film.

701. **Acetic Acid.**—Colorless liquid. Full strength. Will blister the skin. Chemical action, acid. Hardens film and prevents staining. The strength of this acid increases with the temperature; therefore, care should be taken that the fixing bath is kept cool, or the acid will gain too much strength and a strong sediment will be formed in the bath, causing it to become milky and liberate an excessive amount of sulphur from the hypo, causing sulphurization. Prints fixed in a bath of this condition will turn yellow when exposed to the air and light.

702. **The Use of Bromide of Potassium.**— All developers require the addition of a certain amount of bromide of potassium to keep the whites cleared and it is most conveniently used in the form of a 10% solution, which is made by dissolving one ounce of bromide in ten ounces of water. As the amount of bromide necessary varies with the age, degree of dryness of the paper, the purity of the water and chemicals used, it can only be given approximately. It is

easily determined, however, by first adding the amount given in the above formula to the solution and then making a trial test by laying an inch strip of Velox over an important portion of the negative and printing and developing it in the regular way. If the whites appear fogged, add a few more drops of the bromide solution. If on the contrary, the whites are clear and the blacks have a greenish tinge, there is too much bromide in the developer and it will then be necessary to add a little of a stock solution of developer that contains no bromide. To avoid this latter necessity, in adding the amount of bromide do so very slowly and drop by drop, making tests as directed.

703. **Effect of Bromide on Tone of Velox Print.**—Note that when just enough bromide has been added to keep the whites clear, the blacks may have a bluish tinge. Then, if more bromide is added, little by little, and a test print made after each addition, the tone of the blacks will be seen to change gradually from bluish-black to pure black, and if still more bromide is added, to greenish or brownish blacks.

704. **Metol Poisoning.**—Metol is of a poisonous nature attacking some people more than others. It often causes an itching and soreness of the skin. With ortol there is little likelihood of danger and practically the same results can be produced as with metol. If one is subject to metol poisoning, the following ointment will be found to give almost immediate relief:

705. **Ointment Preventing Metol Poisoning.**—

Ichthyol	1 dr.
Lanoline	2 drs.
Vaseline	3 drs.
Boracic Acid	2 drs.

706. Add to this a drop or two of oil of lavender, which destroys all unpleasant odors. Rub well into the skin. It is also excellent for cuts or burns.

707. Another positive cure for metol poisoning, but one which is rather severe, is soaking the hands twice a day for 15 minutes in a strong solution of salt and vinegar.

708. **Developing Notes.**—There are a number of suggestions as to developing, which should be very thoroughly studied and carefully followed to insure good results. Prints may be developed by immersion in the solution or the developer may be applied with a tuft of cotton or a brush. If the former method is to be employed the developer should be placed in a tray somewhat larger than the size of the paper you are using. To the right of this place a tray of water and next to that the tray for the fixing bath.

709. The prints should be immersed, *face up*, in the developer and then evenly covered with the solution *at once*, to insure uniformity of development. This method of development is the most satisfactory for the beginner; but for the advanced worker, the cotton or brush method may be employed instead of the developing tray. Provide yourself with a sheet of glass somewhat larger than the print to be developed. Pour the developing solution into a cup, tumbler or graduate. After the paper has been exposed, place it face up on the glass, then thoroughly saturate the cotton or brush with the developing solution, and pass it quickly over the surface of the print, applying the developer evenly and abundantly. If the exposure is correct the image will appear gradually and complete development will be effected in about 30 seconds, if the "Special" Velox has been used. The "Regular" Velox will require about one-half as much time. If the print flashes up *very quickly* and at once grows black, it is a sign of *over-exposure in printing*. If *under-exposed*, the print will, on the contrary, develop *very slowly* and it will finally be found weak in the important parts.

710. If the immersing method is employed and air-bells gather on the surface of the paper, be sure to break them with the tips of your fingers, or with a tuft of cotton. If not broken they will leave white, undeveloped spots on

the print. If you find that the highlights (whitest parts of picture) are gray, it will be necessary to add to the bath a few more drops of a 10% solution of bromide of potassium. Be careful, however, not to use more bromide than is absolutely necessary to secure pure whites, as an excess of bromide will not only restrain the developing and produce contrasty prints, but will also produce greenish prints. Watch the process of development carefully and when you find the print is almost dark enough remove it from the developer. It is necessary to act quickly as each fraction of a second causes the print to grow darker. If the exposure has been too short, you can not expect to make the print dark enough by prolonged development.

711. If under-printed, prolonged development will produce a stained print, generally a yellow cast over the entire print. Remember that hydroquinone in the developer produces contrast while the metol produces detail even to flatness; so if in printing you have given the correct exposure and your results are flat add a trifle more hydroquinone to the developer. This can be done by adding a few grains to the solution, being careful that they are thoroughly dissolved before developing more prints. If, on the other hand, the results are too contrasty add a trifle more metol. For the beginner we would advise making no attempt to change the proportions of the developer. Later on, however, when more experience has been acquired it will be well to experiment along these lines. It is advisable when the bulk of the solution is reduced to replenish with fresh developer added to the old, or used bath.

712. **Diluting the Developer.**—The effect of diluting the developer for prints is just the opposite in action to what it is in developing plates. A diluted developer will give stronger and more contrasty prints while a full strength developer will produce softer prints. Therefore, when you have dense plates to print from, use the developer full strength and print on the *special* or *special portrait* paper. It is advisable to make the prints first from the heavy negatives. When you come to print your thin plates

dilute the developer at least one-half and use the *carbon* or *regular* paper. Remember, the more you dilute the more contrast can be produced and the action of the developer will be just so much slower. You must, however, be careful as to going to the extreme, or the tone will have a tendency to run into an olive, or green. Remember also, the addition of a few drops of 10% solution of bromide of potassium will aid you in obtaining contrast. If the prints do not develop clear, bromide must be added until they do. Always remember, however, that care must be exercised not to add too much bromide, or the resulting tone will be green or olive. To rectify an excessive addition of bromide add more of the fresh developer.

713. **Caution.**—It is essential that the hands be perfectly clean and dry when handling paper during printing. They should also be thoroughly cleansed before developing. Never attempt to develop a print after the hands have been in hypo without first washing and drying them thoroughly, removing every trace of hypo.

714. **Acidified Rinse Water.**—Immediately after development the prints may be rinsed in clear water and placed in the fixing bath. It is, however, advisable to slightly acidify the rinse water by adding 40 to 60 drops of acetic acid to 2 quarts of water. This acidified water will prevent mealiness and muddiness upon the surface of the prints and will also prevent yellow stains, as it will immediately stop the action of the developer.

715. **Fixing.**—When the print is fully developed it should be dipped either into plain water, or the above acidified water for a few seconds to remove the surplus developer, then fully immersed in the acid fixing bath. In this fixing bath *the prints must be kept moving* for the first half minute to insure uniform and thorough fixing and to prevent stains from uneven action of the hypo on different parts of the print. In order to obviate the necessity of frequently washing the hands to avoid mixing hypo, adhering to the fingers, with the developer, and also in moving

the prints from one tray to another, a small stick may be employed, or a glass rod, or even a small glass funnel (using the stem as a handle). Allow the prints to remain in the fixing bath 15 minutes. Then let them lie for an hour in a tray into which water is running slowly from a faucet; or in water which is frequently changed during the hour. Of course, a number of prints may be placed in the fixing bath, or in the wash water, at the same time, care being used in the fixing that they do not follow each other into the bath too rapidly. Also that each one is moved about for a few seconds before it is allowed to sink to the bottom and remain undisturbed. *Prints are often spoiled by neglect of this precaution.* If this is attended to, no harm will be done if the prints remain for a longer time in the fixing bath, except in hot weather, when they may turn brown, as the bath becomes warm. *Use plenty of fixing bath.* Do not attempt to fix prints in too small a solution. A pint is a small enough quantity, even if you intend to fix only a dozen prints. As the fixing bath keeps for a long time a larger bath should be made up and used continually without renewing. A one gallon bath will fix one hundred 4x5 prints, or their equivalent. For large batches and professional use, large quantities of the bath should be made up.

716. **Washing.**—Imperfect washing will cause the prints to fade after a time, owing to the chemical action of the fixing solution remaining in the prints when dry.

717. **Marring Prints.**—Care should be exercised in the handling of the prints, especially when the temperature of the water is somewhat warmer, for in this condition the prints are soft and the edges may easily be marred. The temperature of the wash water should be kept below 65 degrees and when in this temperature the prints should not be handled over too much.

718. **Drying.**—After the prints have been thoroughly washed, they should be taken from the water and placed face down on cheesecloth stretchers. This will prevent curling to a certain extent. Be careful that they are not

piled one on the other as this would cause them to stick to each other. If the prints before laying out are thoroughly blotted with Royal blotters they will dry much faster.

719. **Caution.**—Do not dry Velox prints between blotters as they are likely to stick and cause much annoyance.

720. **Trimming Prints While Wet.**—In case of necessity prints may be trimmed while wet. For instruction for trimming see "Trimming and Mounting."

721. **Trimming Prints When Dry.**—Velox prints should be dry and perfectly flat for trimming. A trimming board should be used instead of a knife or ruler, as with the board absolutely true edges may be obtained. Prints may be trimmed with a sharp pocket knife, using a glass with perfectly square corners as a guide for squaring the print. They may also be trimmed with large shears with the glass as a guide. The use of the trimming board however gives the most satisfactory results. For detailed instruction see "Trimming and Mounting."

722. **Squeegeeing Enameled Surface Prints.**—Glossy, Special Glossy or Velvet Velox prints may be burnished or squeegeed. Take prints from the wash-water, place face down on a ferrotype tin, squeegee into absolute contact and allow to become bone dry, when they will peel off with the desired lustre. If the tin has been in use for some time, portions of prints may stick. To prevent this, prepare the tins as follows:

723. Dissolve ten grains of beeswax in one ounce of benzine, allowing it to stand for a few hours, in which time a precipitate will be formed. The clear solution should be used for polishing the tins by applying to the surface of the ferrotype plate with a soft cloth (canton flannel.) When the surface of the tin has been thoroughly covered with this preparation, the tin should be polished with dry canton flannel to remove as much of the beeswax as possible. As beeswax varies in its composition, the solution may vary somewhat in consistency, so that an addition of benzine may be necessary to permit polishing the tins easily.

724. **Practice Work.**—The making of Velox prints is most successfully done by artificial light and we advise its use, especially for your first experiments, and as the general run of negatives is more suited to the *special* grades, we advise using these grades for your first work. You may employ any surface to your liking, whether smooth, matte or rough. The principal difficulty with the manipulation of Velox and other gaslight papers lies in the proper exposure. The one advantage of artificial light, be it gas, electric or even the light from a kerosene lamp, is that the strength of the illumination is always the same and when you once obtain the proper exposure, all future exposures from the same or similar strength negatives can be made exactly alike. For your first experiments in developing Velox we advise using the formula exactly as given herein, for this formula is prepared for normal exposures and really needs no altering. After you have had a little experience, the formula may be altered. Altering is advised in order that you may learn the effects produced by diluting as well as using full strength. You will learn by careful reading of the instructions that to produce soft prints, the developer must be used full strength while if you require more contrast dilute the developer with water.

725. **Note.**—You will observe that this method of obtaining contrast with Velox prints is just the opposite to obtaining contrast when developing plates; because when developing plates, by adding more water you produce softness and more detail, while with Velox the reverse is the case. The addition of water, or dilution in other words, gives contrast. Remember this. For your first experiments you should make up several prints on Special Velox, observing the exposure necessary to the final development and fixing. Note on the back of each print all data connected with the production of the results. Should the first prints be failures, so much the better, as in that event they will prove the most important prints in your collection for future reference.

726. When failures are encountered consult the Difficulty Department, where you will find the cause, remedy and prevention for all troubles related to the difficulty in question. After you become familiar with Special Velox, take up the other grades and surfaces and manipulate them, following instructions closely. In all cases make note on the back of all your test prints, whether good or bad, and file them in your proof file. They will serve as good references for future guidance.

CHAPTER XXVIII.

Developing Velox With Prepared Developers.

727. For those who experience difficulty in securing absolutely pure chemicals, or who do not care to compound their own developers, we recommend the use of the liquid developers put up by manufacturers.

728. **"N. A." Liquid Developer.**—This is an excellent ready-to-use concentrated developer for Velox papers. Unlike some other developers it has certain qualities which make it unique in photographic work. "N. A." (non-abrasion) means that all abrasion or friction marks, to which glossy developing-out papers are particularly susceptible, will be prevented by the use of this solution. Another feature is the guide it gives to thorough fixing. The print is not absolutely fixed until the canary yellow color entirely disappears by fixing in a correctly prepared acid hypo bath. This developer yields the softest possible prints when diluted, and it is well to remember that the strength of the developer regulates the softness of the print.

729. The following formula should be used for Special Velox:

N. A. Velox Liquid Developer	1 oz.
Water	4 ozs.

730. **Formula for Regular Velox.—**

N. A. Velox Liquid Developer	2 ozs.
Water	4 ozs.

731. It is important that the temperature of the developing solution should be 70° Fahr. In summer, if necessary to cool the developer, do not place ice in the solution, as it will cause dilution. Place the tray containing the developer into one of the larger size, packing a little ice around it.

732. **Note.**—"N. A." developer should not be used for developing plates or films.

A Universal Prepared Developer for Paper or Plates.

733. **"Nepera" Developing Solution.**—This is known as the universal developer because it may be used not only for Velox, but for Argo, bromide paper, films or plates. Like all "Nepera" liquids, it is a concentrated solution with combination of purest chemicals which will give the best results. It differs from "N. A." Velox Liquid Developer in that it does *not* possess the non-abrasion and fixing guide properties; but on the other hand, when used in combination with "Nepera" capsules, four of which accompany each 4 oz. bottle, it is excellent for films or plates, giving negatives of the quality best suited for developing-out papers.

734. **Formula for Regular Velox Use:**

Nepera Solution	2 ozs.
Water	4 ozs.

735. **For Special Velox Solution Use:**

Nepera Solution	1 oz.
Water	4 ozs.

The temperature of the bath should be 70° Fahr.

736. **For Film in Tank Developer or Kodak Developing Machine Use:**

Nepera Solution	½ oz.
Water	12 ozs.

And add the contents of one Nepera capsule and develop for 20 minutes.

737. **Fixing.**—There is probably no part or process of photography that is more abused than that of correctly preparing a fixing bath and properly fixing prints. To secure permanency prints must be fixed in a fresh solution of hypo. When hypo is first dissolved in water the temperature of the solution is materially reduced. It is important that the temperature of the fixing bath should be maintained as near to 50° Fahr. as possible. Probably more prints fade from insufficient fixing than lack of washing, so these points should be given attention. Have plenty of solution strong enough to thoroughly fix prints in at least 15 minutes. Always use the acid hardener in the bath, as it will overcome the tendency of the fixing bath to cause blisters and stains.

738. **Formula for Preparing the Acid Hypo Fixing Bath.**—

Water	64 ozs.
Hyposulphite of Soda (Crystal or Granulated)	16 ozs.

739. When thoroughly dissolved, add the following hardening solution, dissolving the chemicals separately and in the order named:

Water	5 ozs.
Sulphite of Soda (Desiccated)	½ oz.
Acetic Acid No. 8	3 ozs.
Powdered Alum	1 oz.

740. This solution will keep well; one pint being enough to fix at least two dozen 4x5 prints. If sulphite and carbonate of soda in crystal form are substituted for desiccated, double the quantities mentioned should be used.

741. The most accurate way of preparing a fixing bath is by using a hydrometer, testing the specific gravity; 70 being the correct degree.

742. For the amateur, or those who do not care to prepare their own hardening solution for the hypo bath, we would advise the use of prepared solutions, and the

concentrated Velox Liquid Hardener is especially recommended. For use take,

Water	16 ozs.
Hyposulphite of Soda	4 ozs.
Velox Liquid Hardener	1 oz.

743. **Note.**—Where you prepare your own Acid Hypo bath should the prints bleach or appear brown in tone, it is quite certain you are using too much acetic acid. Perhaps you are using glacial acetic acid instead of commercial No. 8. The former is very much stronger than the No. 8, and should not be used in the hypo bath unless diluted. For difference in strength see Glossary.

744. The washing and drying of prints is exactly the same as previously instructed.

CHAPTER XXIX.

Difficulties—Manipulating Velox and Other Gaslight Papers.

745. **Prints Are Too Light, Lack Detail.**—This is due to under-exposure. The negative may be too dense for the "Regular" paper; use the "Special" papers.

746. **Grayish Mottled or Granulated Appearance of Edges or Entire Print.**—This is due to under-exposure and forced development; old paper; paper kept in a damp place; moisture; chemical stains; fumes from ammonia, turpentine, illuminating or coal gas. Always keep the paper in a dry, cool place, give full exposure and never force development.

747. **Prints Too Black.**—This is generally caused by printing from negatives that are too weak, or thin; by over-exposure or over-development; insufficient amount of bromide of potassium in the developer. Perhaps you have selected the wrong grade of paper to use. Try the "Regular" paper in place of the "Special," as more contrast will thus be secured. Or, if you have too much contrast try the "Special;" this will give you more softness.

748. **Green Tones.**—Green tones are generally caused by using too much bromide; over-exposing; using a developer too weak or old. Use a more concentrated developer or add less bromide. A strong, fresh developer permits the use of more bromide than a weak one, without producing greenish blacks.

749. **Grayish Whites.**—If there is not enough bromide in the developer, the whites will turn gray. Add a few more drops of a 10% solution of bromide. If the print is under-printed and forced in development, it will cause grayish whites. Using old paper will cause grayish whites, or it is also possible that the paper has been fogged by white light while printing or during developing.

750. **Brownish Blacks.**—If the developer has become old and discolored, or too warm, you are likely to produce brownish blacks. Developer exposed to the air will oxidize and then produce brown-

ish blacks. This is also caused by using developer too weak. This may also be due to over-exposure, an excessive amount of bromide, or an old or incorrectly compounded developer. Never use developer after it has become discolored or muddy to any great extent. Imperfect fixing; fixing bath lacking sufficient acid; and if prints are not kept moving to allow even fixing, are all causes for brown or light stains. If the brown tone appears after immersing in the fixing bath, it may be traced to impure sulphite of sodium, or too warm a fixing bath.

751. **Too Much Contrast.**—If your negative is a strong and contrasty one, use "Special" paper and develop with full strength developer. A diluted developer will give more contrast. Double strength developer will produce softness. When double strength developer is used increase the exposure and use more bromide to keep the print clear in the highlights. This will give more softness. (See Special Manipulation of Velox.)

752. **Prints Flat, Lacking Contrast.**—Generally due to over-exposure; or, if the negative is a weak one, full of detail but very thin, you must use the regular grade of paper, as the regular grades develop more contrasty. A diluted developer will aid in producing contrast. Adding more bromide will produce increased contrast, but exercise care that you do not add too much. An over-supply of bromide produces green or brown tones.

753. **Weak Prints (Lacking in Detail).**—This is generally caused by developer being too weak, or under-printing—perhaps under-developing. If the negative is weak, use the regular grade of paper with the same surface. It will produce more contrast. Prints from weak negatives are best developed in fresh full strength developer, fully timed, with plenty of bromide in the solution.

754. **Mottled Shadows.**—This is generally caused by over-printing. Under-developing will also produce mottled shadows. Over-exposed prints, if developed far enough to overcome the mottled effect, would be too dark; therefore, make shorter exposure, so as to be able to develop fully, and this trouble will be overcome.

755. **Prints Too Dark.**—This is generally caused by over-exposure in printing and over-developing. Make shorter exposure and develop longer. Or, remove prints from the developer as soon as they are fully developed and get too dark. Properly exposed negatives will not develop too dark in the developer.

756. **Small Yellow or Purple Stains.**—This is generally caused by developer failing to spread evenly over the entire print; developing prints face down; surface of prints touching bottom of tray, or using trays that are not clean, and by prints being allowed to

remain in the water too long before fixing, after developing. Prints that are not kept moving in hypo bath when first placed there will stain; air-bells gathering between surface of the print and hypo, when first placed in this bath, will cause yellow or purple stains; incomplete fixing will also cause these stains.

757. **Yellow Stains All Over the Print.**—This is generally caused by under-printing and trying to force the print in development; prolonged development; developer too weak; not fixing long enough; insufficient washing after fixing will also cause this trouble. Always dip prints into the acid bath before fixing. Forcing development of an under-timed print will cause stains. In some cases it is due to the fact that the water contains too great a portion of iron. It is very easy to determine that the trouble is due to incomplete fixing, because in that event the print will have a sweet taste. Sea air will affect Velox paper, causing yellow whites; so packages should not be left open, and prints should be developed immediately after exposure.

758. **Blisters.**—Blisters are generally caused (if they do not appear until the prints reach the hypo) by too strong a hypo bath, or too much acid in the hypo; uneven temperature of developer, fixing bath and washing waters; final wash waters may be too warm. Prints may have been creased or broken while washing. Do not allow water directly from the tap to fall upon the prints.

759. **Blisters on Sepia Prints.**—Blisters showing on sepia prints doubtless come from the insufficient use of hardener in the fixing bath, when making the black and white print. Too strong a solution of developer, or too long immersion in this solution will also cause blisters. A salt bath after bleaching may be used if blistering is excessive.

760. **Round White Spots.**—These are generally caused by air-bells gathering on the surface of the paper when the print is first placed in the developer. Always slide the print under the developer, and if air-bells have gathered, break them with the tip of the finger.

761. **Milky Deposit on Surface of Prints.**—This is caused by using a hypo bath which is milky. The bath is either too warm, or too much acid was used; or, the bath was not allowed to settle before using. The deposit will do no harm if you remove it when placing in the wash waters. If there is any trace of milkiness on the dry print it can be removed with a wet sponge. Great care, however, should be taken to have this sediment removed while in the wash water.

762. **Prints Developing Irregular and Freaky, and in Streaks.**—This will occur at times on all makes of paper. It is sometimes

caused by using impure sulphite of soda, which contains sulphate, or by too much dilution of the developer. This difficulty usually occurs during warm weather, when the humidity is great. Keep your developers cool, and if this does not overcome the difficulty wet the prints thoroughly in clear water before developing. Usually a fresh developer used in hot weather will overcome these difficulties.

763. **Edges of Prints Discolored.**—All developing papers are more or less affected when exposed to gas fumes, such as illuminating gas, coal gas, sewer gas and ammonia vapors. It is also caused by using an insufficient amount of developer to spread evenly over entire print. Always keep the package of paper tightly closed when not in use.

764. **Fine Black Lines on Surface of Prints.**—These are generally found on the surface of glossy paper, but at times occur on the matte surface. They are caused by friction before developing and are commonly called "abrasion marks." This friction causes the silver in the emulsion to rise to the surface of the paper, therefore developing black. Oftentimes they can be removed during development by rubbing carefully with the tips of the fingers; or when the print is dry, with a tuft of cotton which has been dipped in alcohol. With matte surface papers these lines can be removed with a soft erasing rubber. Abrasion marks may be avoided entirely by the addition of 5 grains of commercial iodide of potassium to each ounce of developer used.

765. **Small Black Spots.**—Generally caused by pin holes in the negative, or rust in the developer or wash waters.

766. **Round or Irregular Dark Spots.**—These are caused by air-bells forming on the print when placed face down in the fixing bath and by failing to keep prints in motion. It is advisable to turn each print over several times after entering the hypo bath, to insure even immersion.

767. **White Spots Irregular in Shape and Size.**—If a drop of water or saliva touches the surface of the print before printing, it will always leave one or more of these white spots. Extreme care should be taken to avoid the splashing of water from the sink. Never try to blow dust from a negative or sensitized paper, as there is danger of saliva coming in contact with either. Always use a camel's-hair duster for such purposes.

768. **White Spots With Heavy Fine Lines.**—Are usually caused by finger marks. Perspiration from the fingers will leave a mark, on which the grain of the flesh will show. Avoid touching the surface of the paper with the fingers before printing and developing.

769. **Canary Yellow Tones, When the Non-Abrasion Bath Has Been Used, or the Iodide of Potassium Has Been Added to the Regular Developing Bath.**—This is a sure sign that the print has not been fixed sufficiently. The canary color should disappear entirely when properly fixed in a correctly prepared acid hypo bath. The entire disappearance of this color insures correct fixing.

770. **Greenish Yellow Tones Where the Non-Abrasion Developer Has Been Used.**—This is caused from under-exposure and forcing in development. It will fix out if left long enough in a fresh acid hypo bath.

CHAPTER XXX.

Special Printing and Developing of Velox and Gaslight Papers.

771. The reader having followed the preceding instruction on the general manipulation of Velox paper should have a good knowledge of the general manipulation of gaslight papers. However there are numerous little dodges in printing and developing not covered in the preceding instruction, which will aid the photographer in producing most artistic effects with these papers.

772. There are many advantages to be gained by slight manipulation and dodging in the printing, such as holding back portions which print too black, vignetting undesirable parts of a negative, general blending, etc., also printing-in borders.

773. There are times when it becomes necessary to print from negatives which apparently will not give satisfactory results—negatives which if used for printing-out papers would doubtless be failures. Such negatives however, may be made to yield splendid prints on Velox, or other developing-out papers, by proper manipulation.

774. As example No. 1, we will consider a contrasty negative which was probably under-timed or harshly lighted; the highlights print absolutely white, the shadows black, with no detail, and containing no half-tones whatever. Example No. 2, a thin weak negative, muddy, lifeless, flat; highlights thin, filled with detail; a negative of insufficient strength. Prints from such a negative, ordinarily manipulated, would show gray highlights, while shadows would be thin and mealy. No. 3 is a negative

very dense all over, which, with the printing-out paper, could scarcely be made to print satisfactorily. In addition to printing extremely slow with printing-out paper, No. 3 would show absolutely no contrast nor atmosphere.

775. Then there is another class of negatives—those made under most difficult conditions. For instance: Where the circumstances require rapid exposure, necessitating the under-timing of some portions of the plate, such portions will need nursing in the printing, to retain any detail whatever in the shadows.

776. Velox and gaslight papers, properly manipulated, lend themselves better to these requirements than printing-out papers, enabling all that is in the negative to be retained by proper manipulation in the exposure and development.

777. While dodging in the printing, vignetting, blending and masking, are essential to good results, proper developing under such conditions has much to do with the quality of the finished picture. It is the object of this instruction to describe various methods of dodging, printing, and special developing.

778. **Printing Dodges.**—Let us consider example No. 1: A contrasty negative without half-tones. This negative, as before stated, if printed straight would produce prints with black shadows and white highlights. Now, it behooves us to equalize the tone in order to give uniform prints. This can be done in one of two ways:

779. By tissue papering the printing frame and applying dry yellow ochre to the tissue paper, over the shadow portions of the negative, thus holding them back while the highlights are printing. Or, the glass side of the negative may be ground-glassed and the same application of yellow ochre applied. The former is the more simple, requiring less time. By this method small parts may be held back with the ochre applied to the tissue paper. A negative like this can then be printed evenly by any light; but under circumstances where dodging is employed, you must print further from the light; thus giving more even diffusion and

avoiding lines or marks caused by the ochre applied to the tissue paper.

780. Negative No. 2 is a thin, weak negative, having plenty of detail, yet when printed in the ordinary way the highlights are gray instead of mellow and white. Such a negative requires dodging in the printing, as well as in the developing. In the printing you require some method of retarding the action of the light to print deep and slow, because there are no strong highlights, nor dense shadows, but a flat mealy negative. Therefore, expose the negative by diffused light, covering the printing frame with tissue paper. The catch-lights, or the strongest point of light, should be slightly outlined with a little Prussian blue, applied to the tissue paper. This will give some contrast in the printing. When developing such prints the developer must be diluted, and sufficient bromide used to restrain the print from developing too rapidly.

781. Of course, in the first place, contrasty paper should be selected to print on. Under such circumstances there are three points to be considered: First, the selection of paper suitable to such a plate; second, the necessary dodging in the printing to assist in producing contrast and snap to the highlights; third, the final manipulation to further assist in carrying out the operations necessary to produce the required snap.

782. In No. 3 we have an extremely slow printing negative, hard and contrasty. Such a negative should not be printed from in that condition, but should be reduced with red prussiate of potash reducer, as the negative can then be reduced and made to yield good prints with ordinary manipulation. See instructions on "Reducing," Volume II. If prints are desired from such negatives, without reducing them, the important consideration will lie in the selection of the grade of paper suitable for hard negatives, which should be the "Special" papers. Time them fully and develop slowly.

783. **Dodging During Exposure.**—Frequently during exposure results can be improved if a portion of the nega-

tive is held back somewhat, without masking the entire negative. Portions may be restrained, or held back by the following method:

784. Provide a hand blender, which is made as follows: From a sheet of ordinary window glass cut a strip 12 inches long and ½ inch wide. Paste on the end of this glass rod a round piece of opaque paper, or thin cardboard, about the size of a quarter. The glass rod containing the opaque paper or cardboard, being transparent, will permit the blending of any portion of the negative without interfering with other portions. By means of the blender, interposed between the light and the part of the negative it is desired to hold back, you can restrain to any degree desired. Where for instance, 15 to 20 seconds exposure is given for complete printing, a few seconds restraining with the blender over the parts you wish to hold back will make a surprising difference. The blender must not be held stationary, but be moved about gently with a circular motion. The degree of blending is controlled by the distance the blender is held from the negative. Usually, when the blender is used, printing is done farther from the light, allowing more latitude for the blending and dodging. If the blender is held too close to the negative it will show a sharp line. In printing from portraits where the face or arms are a trifle thin, the blender is almost indispensable. With it the flesh portions may be restrained sufficiently to give a well balanced print. In many instances, particularly in portraiture, to prevent flesh from printing too dark, the entire print is under-printed, thus giving a weak, mealy effect. By means of the blender these portions may be held back and the print carried to the proper depth, affording good results and rich half-tones.

785. **Special Development.**—With the formula recommended for special developing of Velox, or gaslight papers, the contrast producing chemical (hydroquinone) can almost be dispensed with, developing being entirely accomplished with metol. As stated in previous instruction, the desired degree of softness, even to flatness or contrast, may be

obtained by altering the proportions of metol and hydroquinone. Metol affords a steady and gradual developer; hydroquinone supplies strength and contrast.

786. **Special Developing Formula.—**

Water.....10 ozs.
Metol.....14 grs.
Sulphite of Soda (Granular or Anhydrous).....½ oz.
(If Crystals are used.....1 oz.)
Hydroquinone.....15 grs.
Carbonate of Potassium.....½ oz.
Mix in the order given.

787. Prepare the hypo acid fixing bath in the ordinary way, keeping the bath at from 50 to 60 degrees Fahr.

788. For your first experiments the developer should be made up in small quantities, and may be altered for strength or softness to suit your needs. Remember, hydroquinone gives strength, metol retards; so if more softness is required use less hydroquinone or increase the metol. If more strength is desired increase the hydroquinone.

789. To derive the most benefit from the experiments work methodically and keep a memorandum of each experiment. The following data should be noted on slips, and these slips filed in a proof file for future reference:

790. **Memorandum Blank**, as follows:

Negative—State whether Strong or Contrasty, etc.
Paper—State whether Special, or Regular, etc.
Developer—
Water..... ... ozs.
Metol..... ... grs.
Sulphite of Soda..... ... ozs.
Hydroquinone..... ... grs.
Carbonate of Potassium..... ... ozs.
Bromide of Potassium..... ... grs.
Results, good; if poor, mark "bad."

792. When printing for development by this formula, if the regular exposure is given—exposure proper for a diluted developer—the print, when placed in this developer,

would have to remain a few minutes before acquiring the required strength. Prolonged development would bring out the blend more evenly, but there would be danger of producing yellow or grayish whites and losing snap and vigor. Therefore, it is necessary when developing by this formula, to print longer than ordinarily. About a third more exposure should be given.

793. In this formula there is used considerable less of the strength producing chemical (hydroquinone). By the extra long exposure given, provision has been made for all the detail required. Therefore it is simply necessary in the development to retain this detail by proper handling of the strength producing chemical. If too much of the strength producing chemical is used the shadows will develop too quickly, showing strong and black; they having been printed deep, the detail would fail to develop in the highlights or whitest parts of the print.

794. Very often you will find that instead of changing the amount of ingredients, metol or hydroquinone, simply adding water will produce the desired results. For thin negatives which have plenty of detail in the highlights and deepest shadows, negatives probably produced by over-exposure and under-development, dilute the developer by adding two-thirds more water. For hard or medium strength negatives use full strength developer and add from 10 to 15 drops of bromide. In using developer of double strength a considerable amount of bromide may be introduced without danger of producing a print too green. When printing from a medium strength negative, it is safe to add bromide until the print develops clear without developing a green tone. Frequently it will be found to take as much as one-half ounce of a 10% solution of bromide to produce good results. Always bear in mind, that green prints are generally produced by adding too much bromide. Add bromide in small quantities until the whites are clear with the green tone invisible.

795. When diluting developer for thin negatives use very little bromide, as the water acts as a restrainer and

ON THE FROZEN RIVER

Study No. 16 See Page 387 By John Chislett

PORTRAIT
See Page 387

Study No 17 By E. A. Brush

should more bromide be added it would doubly restrain the developer.

796. As you time longer than for ordinary developing when using this bath there is considerable more latitude in the printing. For this reason, do not be afraid to give an abundance of exposure. In testing the developer, first start with 10 to 15 drops of 10% solution of bromide. If the whites are not clear add a few more drops of bromide, and continue adding until the whites are clear. Bear in mind, if the prints begin to develop green, too much bromide has been added. In such an event add more fresh developer to the bath, just enough to keep the prints from developing green, and producing soft whites.

797. A good method of developing a print is to place it in the bath in the ordinary way, handling it over two or three times until the image begins to appear. When it does show place the print on the palm of the left hand, face up, and with the right rub very gently over the surface backward and forward. The rapidity with which the print will develop will be surprising. The warmth from the hand speeds the developing. If there are portions of the print that do not develop as rapidly as desired; or, should you wish to develop some portions before others; rub only these portions, dipping the fingers frequently into the developer. This will give a great degree of latitude in developing and enables the making of good prints even from poor negatives.

798. There are times when it is desirable to exclude parts of a negative from printing. For example: In portraiture, when only a portion of a figure is desired, or part of a waist in a bust picture is to be eliminated; in landscapes, where an artistic picture could be made if a tree or a stump could be eliminated; with a group picture where persons or details not a part of the group, come within the range of the lens. The effect in any of these cases would be very much improved if the objectionable part could be eliminated. This can be done by vignetting.

799. **Vignetting Velox Prints.**—By vignetting is meant

the method of printing, by which the margins of the picture are made to gradually fade or blend away. This effect is produced in various ways.

800. **Methods of Vignetting Portraits and Eliminating Undesirable Portions of any Negative.**—The methods that will be described are thoroughly practical. While the last method requires a little extra work to prepare, most effective results can be produced through its adoption.

801. The first method is to take a piece of cardboard a trifle larger than the negative you are printing from. Cut a hole in this board a little smaller than the portion of the negative you desire to show in the print. (See Illus. No. 9½, Page 157.) Next make small notches like saw-teeth ¼ to ½ inch deep in the edges of this opening. The saw-tooth effect will blend the light which falls upon the negative because the light will filter in between the teeth. More blend can be produced by holding the cardboard a greater distance from the negative. About ½ inch from the negative is as close as the work should be performed. The cardboard must be kept in motion during exposure (a circular motion is best). See that the card completely covers the parts of the negative that are not to show in the print.

802. A slower method, slow in printing, but which will do away with the necessity for keeping the vignetting card moving, and will produce soft results, is to build up the cardboard one-half inch from the negative and fasten to the printing frame, covering the opening with a fine quality of white French tissue paper, or onion skin, which can be purchased at any photo supply house. If the negative is thin, use light blue tissue. Blue will cause the negative to print slowly, but the resulting print will be stronger.

803. A simple way to arrange this vignetting device so it can be fastened to the printing frame, is to take the cover of a dry plate box, large enough to practically cover the printing frame. Cut into the corners about ¼ of an inch. Make a light cut from corner to corner on both ends and sides, so they can be bent outward, forming a lip, which can be tacked to the printing frame. Next cut a

hole in the cover, as described in making the vignetting card, and cover with tissue paper. Several vignettes can be made different sizes and shapes. One or the other will fit any ordinary negative you may wish to vignette.

804. Another method of vignetting, and this is especially intended for portraits, is to paint the film side of the glass with opaque. See instruction for making opaque, in Chapter XL, Dodging in the Printing, but when applying this method, instead of blending you merely block out undesirable portions, and the blocking out must be done in an irregular way—sort of hatch or design shape—to give the appearance of brush developing, as though the print had been developed with a brush, swabbing backward and forward. This method is best applied where white or very light grounds are used.

805. The third method is to produce a vignette effect by simply developing the parts of the print that it is desired to show. This, as before stated, is a much more difficult process, but with practice and care fine results can be produced with it.

806. **Method of Procedure.**—To execute the developing method of vignetting, place the sensitive paper on the negative in the printing frame in the regular way; hold the frame up to a yellow light so you can see through the paper from the back. With a soft pencil outline on the back of the paper the parts of the view you wish to show. By holding the glass and print before the yellow light, you will be able to locate the part you have outlined with the pencil. Next place the paper back on the printing frame and expose the entire negative to the light just as though you wanted all of the print to show. Next wet a piece of glass, a trifle larger than your print, placing the undeveloped print on it face up. The wet glass will prevent the print from curling or sliding. You may hold the glass containing the undeveloped print in the hand, or place it on a table. With a tuft of absorbent cotton, which has been previously dipped in the developer, carefully swab the parts to be developed, always beginning in the center of a

print, working slowly until the image begins to appear. Continue the swabbing as far as desired. As you near the point where it is intended to stop development, work more lightly. In this way a soft blending into the background can be produced.

807. Another method of obtaining vignettes by development is accomplished by the use of glycerine or a solution of sugar, this latter being obtained by boiling crystal sugar until it becomes gummy and then straining it through fine muslin. With this method, truer vignettes can be obtained than when the developer is applied direct to the paper. It is advisable to have a fully developed print at hand, as a guide by which to vignette the print. Take a sheet of glass, coat it with glycerine or the sugar solution and lay the print on it, face up, being careful to observe which way it is taken from the negative so as to be able to locate the highlights with the aid of the guide print. The glycerine will hold the print down without curling. Next, mix one part glycerine or sugar solution with three parts developer and then apply, with camel's hair brushes or a tuft of cotton, the mixture to the print, first laying it on the highlight portions, then on the half-tones, and finally on the shadows, always beginning to work in the center of the print. In this way, over dense shadows can be restrained. Gradually work out toward the edges of the print, leaving these parts until almost all of the print which is desired has gained its full strength. The gylcerine will so retard the action of the developer that it will leave a perfectly vignetted edge, those parts of the print untouched with developer clearing up a pure white in the hypo bath. The sugar solution used as a retarder will tend to preserve the rich black tones of the print, while glycerine will frequently give brownish tones, which are, however, by no means displeasing.

808. Care must be exercised regarding temperature of the developer. Never use a warm or a badly discolored developer. Use fresh cold developer. Warm developer will cause the image to oxidize very quickly leaving a yellow

or brown outline to the vignette. When sufficiently developed, place in your acid clearing bath for a few seconds and then transfer to your regular acid hypo bath.

809. First results will probably not be satisfactory, as it requires a little practice to produce soft blended effects in the vignette. After fixing, should the vignette appear quite harsh; the outline too sharp; printed parts leaving off too abruptly; they can be blended by applying, with a tuft of cotton, a strong solution of chloride of lime. After softening down the vignette, dip the print in fresh water and return to the hypo for ten minutes. This is necessary, because any part of the print which has been removed with the chloride of lime is apt to redevelop and appear again, unless fixed in the hypo.

810. **Life of Hypo Bath.**—The question which arises in the mind of both amateur and professional is, "How long, and for how many prints, can the hypo bath be safely used?" In paragraph No. 715, Printing and Developing, was given definite directions in regard to the number of prints a given quantity of hypo bath would properly fix. The following advice, combined with the photographer's past experience will be a splendid guide to judging when the fixing bath is practically exhausted and, therefore, unsafe for further use. If an acid hypo bath is being used it will, when exhausted, be found to turn milky. There will be a white sediment which does not readily precipitate, but continually floats. The solution will appear soapy, forming suds and bubbles, not unlike soap suds. When the hypo bath acts thus, it should be discarded and a new bath made up at once. Hypo baths should be prepared fresh at least once a week, even if only slightly used.

811. **Scum on Surface of Prints.**—Scum is caused by sulphurization. If the hypo bath is too strongly acid, the acid will release the sulphur from the hypo, causing the extremely milky appearance. This can generally be charged to the acetic acid and alum, the latter being strongly acid. Exact proportions of alum, hypo and acid are essential to avoid this sulphurization, as the relative strengths of these

chemicals vary from time to time. It is almost impossible to judge when the proportions are right, and an excess of either will cause the trouble. With the ordinary means at hand it is impossible to decide which is in excess; so if you are troubled to any extent, it is wise to pour a portion of the fixing bath into a small tray and add a trifle more hypo. Try a print in it and if the results are not better, add twice as much alum as you did hypo, and try again. The effect of sulphurization will then very likely be overcome.

812. Scum is also caused by allowing prints to lie for some time without being separated. These developing papers, having a gelatin surface, are apt when wet to sink to the bottom of the tray and mat (stick together). It is, therefore, necessary to handle them over and over during fixing. If careful to use the acid clearing bath (formula given in paragraphs 738-740) there will be less danger of forming this scum.

813. **Removing Yellow Stains From Prints.**—At times when vignetting or printing—producing a white border on the print—yellow stains are apt to appear. These can be readily removed with the following bleaching solution: In a 10-oz., wide mouthed bottle place 1 ounce of red prussiate of potash (ferricyanide of potassium). To this add 6 ounces of water. Shake well. The red prussiate will dissolve slowly. Wrap this bottle with black opaque paper, label the bottle "Red Prussiate of Potash Solution," and keep in the dark room away from strong light.

814. To remove the stains from the print, take one pint of a clear solution of hyposulphite of soda, 10° hydrometer test, add two—not more than three—drops of "Red Prussiate Solution." Too much prussiate would quicken the action and if it acts too rapidly it is apt to bleach the entire print, possibly staining it; so be sure not to have the bath too strong. With a tuft of cotton swab the parts of the print that have stained yellow. If the print is mounted swab both the print and the mount with the solution until the yellow disappears. Then rinse off with clear water. If the mount was not swabbed, the solution would leave

streaks. It is well to use absorbent cotton or a very soft sponge to remove the water, as the chemicals will thus be more quickly and thoroughly eliminated.

815. After the prints are washed clean, lay them out to dry. The bath must be used only while fresh, not after it becomes discolored. Usually a bath of this kind is good for only half an hour. Should it be found necessary to employ the bath for a longer period, make a fresh solution.

816. **Overcoming Abrasion Marks.**—Frequently there will appear on the prints fine black lines or soiled whites, more especially on glossy prints. These are called abrasion marks and are caused by friction, breaks in the surface of the paper, or rubbing from the paper. As this causes the silver to rise to the surface, when it comes in contact with the developer black lines or soiled whites are produced. To overcome this difficulty add 5 grains of iodide of potassium crystals to every ounce of developer stock solution.

817. Such lines and marks can be removed from the print by rubbing with a small wad of absorbent cotton slightly moistened with wood alcohol. The prints, however, must be perfectly dry before cleaning.

818. For your future guidance results of first experiments should be preserved with a memorandum of your results noted on the backs thereof. These prints should then be filed in the regular proof file.

819. **Practice Work.**—This instruction should not be undertaken until the previous instruction for general manipulation of Velox has been well mastered, because you must have a fair idea of the general results to be obtained with Velox before this special instruction is undertaken. As this instruction also deals with vignetting of prints, it will frequently be found most convenient to vignette some of the negatives, omitting objectionable portions, which, if left in the print, would tend to spoil the general effect.

820. After reading carefully, that this instruction may be thoroughly understood, make a few prints and observe their condition from the exposing, developing and fixing to the final drying. Note; we recommend full exposure

with plenty of bromide. After a few experiments with the normal bath, as given in the formula, you should be prepared to adjust the developer for various effects, as explained in the instruction. Follow this with experiments on Royal Velox, which has a yellow body. It is intended for broad effects and is usually employed for large and sketchy work.

821. Preserve test prints of each manipulation, noting on the back of each all necessary data pertaining to their production. Include in this failures and successes alike, as both are important for your future guidance. Whenever meeting with failures, consult the difficulty department, where a remedy for the trouble will be found. File all prints in a proof file for future reference.

Note.—In professional studios, where a large number of prints are fixed, a fresh hypo bath should be made up each day. Hypo is very cheap, and more difficulty from discoloration, blisters, etc., can be traced to exhausted or incorrectly balanced hypo bath than from any other source. If a developer containing iodide of potassium is used the life of the hypo bath can be readily determined, for if the canary yellow of the prints does not disappear in five minutes, it is a question whether the hypo bath is in a condition to fix a print, no matter how long it remains in the bath.

CHAPTER XXXI.

Difficulties—Special Printing and Developing of Velox.

822. **Shadows Too Black Before Sufficient Detail Has Been Produced in the Highlights.**—This difficulty generally occurs when a negative is contrasty. In a landscape picture there may be extremely heavy foliage in the foreground, with the highlights probably rather dense. In the ordinary way, when printing dark enough to produce detail in the highlights, the shadows are overprinted, and, therefore, develop too black. Generally, they are too black before you have enough detail in the highlights. To overcome this difficulty interpose a piece of cardboard between the light and that part of the negative which prints too quickly, exposing the hard portions for a few seconds only. Keep the cardboard moving, backward and forward, with rotary motion, to produce a light vignette effect. If the cardboard is allowed to remain motionless, the result will be a sharp line between the highlights and shadows. After holding back the shadows for a few seconds in this way, expose the entire plate evenly. By carefully following the instructions in developing, these dense, deep shadows will most always be overcome.

823. **Stains on Edges of Vignette.**—If the vignette is produced in the developing, the stain sometimes obtained on the edge of the vignette is of yellow or brownish color. This is usually caused by developer becoming discolored or too warm, and printing too dark. Follow the instructions in regard to removing this stain.

824. **White, Milky Deposit on Prints.**—This generally occurs if the hypo bath is not properly balanced, having either too much acid or alum, or vice versa. The milky deposit will do no harm if removed from the prints after they get into the wash water. Allow the hypo bath to stand without agitation, and the milky deposit will settle. Then decant the clear solution, and use it for fixing the prints.

825. **Prints Yellow Before Placing in Hypo.**—If the print was under-printed and you attempt to force it by prolonged developing,

it will generally turn yellow. To avoid this difficulty print to the proper depth.

826. **Prints Becoming Yellow in Spots While in the Hypo.**—Yellow spots are caused by air-bells gathering between the print and the hypo solution. Wherever there is an air-bell there is sure to be a yellow spot. To overcome this difficulty, see that prints are thoroughly immersed and air-bells removed when first placed in the hypo. The prints should also be picked over and over, to separate them, while fixing.

827. **Prints Becoming Yellow All Over in Hypo.**—If your hypo is warm, or has become exhausted, too many prints having been fixed for the amount of hypo, the prints will yellow. Remedy: Do not fix too many prints in the hypo bath, and see that the bath is cold—never warmer than 60° Fahr.

828. **Prints Yellowing During Washing.**—This is sometimes caused by vegetable matter in the water. To test the water for vegetable matter, take a pail and fill it with water, placing a handful of alum in it and stirring well. Allow this to stand for a few days and pour off the water. If there is vegetable matter in the water, a slimy, mossylike substance will be found at the bottom of the pail. As a rule, water like this will not cause prints to yellow, as they are not permitted to soak long enough to bring about that result. If prints soak in the water over night and the water becomes warm, it is apt to cause them to become yellow. Wash prints as rapidly as possible, see that the wash waters are not warm, and you will have no trouble with prints yellowing during washing.

829. **Prints Developing Irregular, Freaky and in Streaks.**—This generally occurs when the printing is too dark. By the time the highlights are developed and have sufficient detail, the shadows are only about half developed and appear streaky. To overcome, decrease length of printing. Occasionally, you will find in paper of all makes some that will develop streaky. To overcome this wet the print before developing.

830. **Grayish Whites.**—This is caused by lack of bromide in the developer. Add a drop or two of bromide. If the paper has been light struck the whites will also become gray.

831. **Prints Stained Around the Edges.**—This occurs in old paper, and also where insufficient bromide has been used.

832. **Parts of the Print Will Not Develop, Leaving White Spots—Spots Blending at the Edge Like a Vignette.**—This is either caused by damp fingers or a splash of water. A print of this kind cannot be saved. You must guard against having anything damp come in contact with the paper, before printing, or developing.

833. **Black Spots.**—Black spots are sometimes produced by rust in the water, or in the developer. Any metallic substance that

comes in contact with a print, during developing, will cause a black spot.

834. **Small Yellow or Purple Stains.**—Caused by air-bells on the prints during fixing. Purple stains are generally caused by prints coming in contact with the bottom of the tray during development. Warm fingers are also the cause of purple stains.

835. **White Spots.**—Small white spots, generally perfectly round in shape, are caused by air-bells gathering on the print when first placed in the developer. These should be broken at once. If this is overlooked, the spot will not develop, and even after the air-bell is brushed from the print, if allowed to remain any length of time, the developer will have no effect on the spot which was covered by the air-bell. When placing print in the developer slide it underneath the developer, and with the tip of the finger immediately remove any air-bell, or particle of dirt, which may gather on it.

836. **Tone of Print Brown.**—Brown tones are caused by overexposure and excessive use of bromide. Learn to print to the proper depth, and be careful not to use too much bromide, but just enough to obtain clear whites.

837. **Tone Blue-Black, Whites Having a Grayish Tint.**—A certain sign that not enough bromide was used.

838. **Too Much Contrast.**—This difficulty you can overcome by being careful to use a soft grade of paper for a contrasty negative; also by using full strength developer, printing portions of negative which are too strong longer than the parts which print dark. To do this, interpose a cardboard for a few seconds between the light and the portion of the negative you want to hold back during printing.

839. **No Contrast.**—For flat negatives use a contrasty grade of paper. Cut down the exposures and develop in weak developer. Oftentimes it is necessary to add a little more bromide, as it will help to produce contrast.

840. **Prints Turn Brown in Hypo Bath.**—If a print turns brown in a hypo bath, there is being produced what is called a sulphur tone. This shows that the fixing bath is not balanced properly, evidently being too strong in both acetic acid and alum. If prints are left in the bath over night they will become quite brown. A bath of this kind should be discarded, or more water and hypo added. The cause of the bath toning brown is that the acid releases the sulphur from the hyposulphite of soda, causing a sulphurization.

841. **Prints Yellow and Bleached After Treating With a Little Red Prussiate Solution.**—This trouble results from using the solution too strong. Employ a weak solution and this difficulty will readily be overcome.

842. **Edges of Vignette Bleaching Too Rapidly When Using**

the Chloride of Lime.—Care must be exercised in using the chloride of lime. If you are applying it with a tuft of cotton, be sure there is not too much chloride of lime solution on the cotton, but just enough to wet it and no more. When reduction has proceeded far enough, place immediately in water.

843. **Chloride of Lime Solution Not Reducing or Clearing the Whites.**—Solution is probably not strong enough. Strengthen by adding more of the chloride of lime. Rubbing just a little bit harder with a tuft of cotton will hasten the reduction.

CHAPTER XXXII.

Sepia Tones on Velox and Other Gaslight or Bromide Papers.

844. While the practical making of sepia prints by direct development is a problem still unsolved, most satisfactory results are obtained by a process of bleaching and development. The process is extremely simple. Any print which has been properly fixed and washed, regardless of grade of paper (even prints that have been made for some time) may be changed to a sepia tone in a few minutes, without loss of detail in the highest lights, or change of contrast. The tone is governed principally by the printing quality of the negative. A print from a thin, weak negative will give a rather muddy sepia, while one from a negative of good strength will produce brilliant shadows and clear, mellow highlights.

845. **Permanency.**—Prints toned in hypo alum have been proven permanent by thousands of users of bromide paper. Re-developing produces a result chemically identical to that obtained by the hypo alum toning, the print suffering no change in detail or gradation.

846. **Uniformity.**—Following the directions given herein will insure absolute uniformity.

847. **Rapidity.**—A print may be toned a sepia in less than two minutes' time, by the following re-developing process. The prints are first bleached until the deepest shadows have almost disappeared. They are then placed in the re-developing solution until all the detail has re-

turned in the prints. Make up the stock solutions as follows:

848. **No. 1. Bleaching Stock Solution.—**

Ferricyanide Potassium	2½ ozs.
Bromide Potassium	2½ ozs
Water	60 ozs.

849. **No. 2. Re-Developing Stock Solution.—**

Sulphide of Soda	2½ ozs.
Water	30 ozs.

850. Prepare the bleaching bath as follows: Of Stock Solution No. 1, take 4 ozs., water, 4 ozs., aqua ammonia 4 drops.

851. Prepare your re-developing bath as follows: Of Stock Solution No. 2, take 1 oz., and water, 8 ozs.

852. Pour the 8 ozs. of bleaching bath into a tray no larger than is absolutely necessary to hold the prints. This tray must be used for no other solution. Pour the 9 ozs. of re-developing bath into another tray, which must never be used for any other purpose than to hold the re-developing bath.

853. **Manipulation.**—First immerse the print in the bleaching bath. Allow it to remain until but faint traces of the half-tones are left, and the black of the shadows has become weak. (The image will then clearly resemble an undeveloped platinum print.) This will require about one minute. Next rinse the print in fresh water and place in re-developing solution.

854. Allow the print to remain in this solution until all of the original detail has returned. This will require about 20 to 30 seconds, after which the prints should be washed thoroughly. A large variety of sepia tones can be reproduced in this way. The warmth of tone is governed principally in the bleaching bath. For example, a print bleached so there is almost nothing left, will be of different tone than a print bleached but slightly. Judging the exact amount of bleaching can only be acquired by practice. Of course the quality of the negative has much to do with

the depth of tone. A soft negative will give a warmer tone than a hard, contrasty one. A hard, contrasty print should be bleached farther than a soft print.

855. **Prepared Re-Developing Solutions.**—For those who do not care to prepare their own chemicals the prepared re-developing solutions can be obtained from the manufacturers, or any dealer in photographic supplies. One fifty cent package of re-developer will enable one to re-develop three hundred 4 x 5 prints, or their equivalent. The prepared solution is generally put up in a concentrated form, consisting of a box of fourteen capsules and a bottle of solution. Each capsule contains chemicals, which require only the addition of a certain quantity of water and a few drops of aqua ammonia to make a bleaching bath for the reduction of the print before re-development. The liquid contained in the bottle is highly concentrated and should be used carefully. It is important that the prints should have been thoroughly washed so that no trace of hypo remains before re-developing them.

856. **Preparing the Bleaching Solution.**—To prepare the bleaching solution dissolve one capsule in 4 ounces of water. Place this solution in a bottle and label "Bleaching Solution." Next add to this solution 3 drops aqua ammonia (full strength ammonia) and tightly cork the bottle.

857. **Preparing the Re-Developing Solution.**—To prepare re-developing solution take one pint of water and add one-half ounce concentrated solution of re-developer. This solution must also be placed in a bottle and kept tightly corked. Label the bottle "Re-developer."

858. When ready to use, pour the bleaching solution and the re-developing solution into their respective trays and proceed exactly the same as formerly instructed. The prepared re-developer will also produce excellent sepia tones on any bromide or gaslight paper. The age of the print does not seem to make any difference in the tones obtainable. The finest results are obtained from prints which have a good black tone rather than green or olive, as would be produced by the use of too much bromide.

859. **Life of the Re-Developing Bath.**—Both the bleaching and re-developing baths will retain their strength for some time if kept in well stoppered bottles; therefore, immediately after use the baths should be returned to the bottles and tightly corked. If the prints show a tendency to blister it doubtless comes from not having used sufficient hardener in the fixing bath, when making the black and white prints. Too strong a solution of re-developer, or an immersion of excessive length in this solution will also cause blisters. A salt bath after bleaching may be used if blistering is excessive, but should not be necessary if prints when first made are properly fixed in a fresh acid hypo bath. The use of pure aqua ammonia is recommended. The ordinary household ammonia should be avoided. This chemical clears the whites and does not change the tone unless an excessive amount is used.

860. **A Special Re-Developing Bath That Will Not Blister.**—For those who have experienced difficulty with the previously mentioned baths or prepared solutions, we can recommend the following formula. This formula should be prepared in three solutions and the solutions kept in tightly corked bottles.

861. **Solution No. 1.—**

Water.....24 ozs.
Ferricyanide of Potassium.....1 oz.

862. **Solution No. 2.—**

Water.....24 ozs.
Bromide of Potassium.....1 oz.

863. **Solution No. 3.—**

Water.....48 ozs.
Sulphide of Soda.....½ oz.

Note.—Do not confuse Sulphide with Sulphite.

864. For use mix equal proportions of 1 and 2. For example, if you find it necessary to use 4 ounces of solution use 2 ounces of No. 1 and 2 ounces of No. 2. Add to

this from 4 to 6 drops of aqua ammonia (full strength ammonia). Add enough ammonia so that the solution will possess a strong ammonia odor. The Nos. 1 and 2 combined constitute the bleaching solution. Solution No. 3 is the re-developing solution. Pour 4 ounces of this solution into a tray and you are ready for toning. Place the print first in the bleaching solution until it is sufficiently bleached. Then rinse for a few minutes in water, after which place it in the re-developing solution. The image will come up brown, and all detail which was lost in the bleaching will be re-developed. When fully re-developed, place the print in the wash water. The bleaching and re-developing will have a tendency to cause the print to soften. When this occurs place the print, after re-developing and washing, into a weak solution of alum. This will harden the surface. After hardening, wash thoroughly in the usual way. The tone is governed to a great extent by the quality of the negative. As before explained, it will be found that the amount of ammonia as well as the bleaching will vary the tone considerably.

865. **Note.**—This bath must be made up fresh each time. The stock solutions for bleaching will keep indefinitely if kept in a tightly corked bottle.

866. **Practice Work.**—For practice on sepia toning, it is not necessary for you to make special prints, although it may be done; any prints you may have can be re-developed to give a sepia tone. The warmth of tone, as you will note by reference to instruction, is controlled entirely in the bleaching bath, so a large variety of tones can be obtained and, of course, various negatives will have the effect of producing different tones. A hard negative for instance, will produce a colder tone than a softer one, and vice versa.

867. Complete data should be written on the first experiments and these prints filed in the usual way for future guidance.

CHAPTER XXXIII.

Azo and Nepera Gaslight Paper.

868. **Azo Paper.**—Azo paper, being coated on a cheaper stock, is furnished at a lower price than the regular Velox paper, being intended principally for commercial purposes.

869. The manipulation of Azo paper is exactly the same as Velox and the paper is furnished in four surfaces—Carbon, Rough, Glossy and Semi-Gloss. Azo is furnished in two qualities, soft and hard.

870. Carbon (Grade A) is a fine velvety matte surface paper especially adapted for work requiring full detail on a matte surface paper. This is furnished in double weight as well as single.

871. Rough (Grade B) has a rough surface grain excellently adapted to show artistic effects in landscapes.

872. Glossy (Grade C) is a highly glossy surface paper, giving the most detail that it is possible to obtain. This is furnished in double as well as single weight.

873. Semi-Gloss (Grade D) is a product, which, by its extreme range of gradation is suited to the majority of landscape and portrait negatives.

874. Azo paper has a blue body and, therefore, requires a little more bromide to obtain olive black effects. Too small a quantity of bromide will give blue prints. Aside from this, Azo paper is manipulated exactly as Velox.

875. **Printing.**—The printing of Azo paper is the same as regular Velox, and is best effected by artificial light.

876. **Developer.**—Azo paper may be developed with any of the formulæ previously given for Velox paper, but the formula recommended for Nepera papers, on a following page, will also serve as a good developer for Azo paper.

877. **Practice Work.**—Azo paper, besides being a cheaper product, is also coated on a blue body paper, thus giving a little colder tone. Therefore, a little more bromide may be employed in the developing to offset the blue and change to a light olive. The manipulation of Azo is practically the same as Velox, or other gaslight papers. There is one advantage, however, with Azo over the Velox. The grain of the paper appears closer and is, therefore, preferable for small negatives. In fact the results very nearly approach platino, or matte surface printing-out paper. This paper is generally employed in studios for commercial purposes, and uniform results may be obtained with it. For the finer results, we recommend Velox; yet as you should become familiar with the manipulation of the cheaper products, test prints should also be made on Azo and filed, with all data pertaining to production.

878. **Nepera Gaslight Paper.**—Nepera paper is a superior developing product for use in professional portraiture. It is made with special reference to the requirements of studio photography, and particularly adapted to the average portrait negatives. It can be printed by any light. Nepera is made in one speed and two weights, single and double, and comes in three surfaces, matte, velvet and rough. The surfaces require no description, except that the velvet is semi-gloss. Double weight Nepera is an extremely heavy stock, desirable for unmounted prints or those delivered in folders. Embossed double weight velvet Nepera when re-developed is especially attractive and looks like platinum.

879. **Developing.**—Nepera paper is best developed with one or the other, of the following formulæ:

880. **Metol-Hydro Developer. Stock Solution.**—Dissolve chemicals in the order named, *stirring constantly.*

Hot Water	100 ozs.
Metol	½ oz.
Hydroquinone	2 ozs.
Sulphite of Soda (Desiccated)	7½ ozs.
Carbonate of Soda (Desiccated)	12½ ozs.
Bromide of Potassium (Crystals)	120 grs.

881. **Note.**—Where crystals of sulphite or carbonate of soda only can be obtained, double quantity must be used. **In cold weather,** immediately after dissolving chemicals, add 13 ozs. of wood alcohol to the above stock solution to prevent *precipitation.*

882. The above developer can be rendered non-abrasive by the addition of 5 grains of commercial iodide of potassium to each ounce of stock solution.

883. **Note.**—The photographer whose fingers become irritated by the use of metol is not likely to experience this trouble in using ortol, and vice versa.

884. The following ortol formula will produce equal results to metol:

885. **Stock Solution.**—Dissolve chemicals in the order named, *stirring constantly.*

Hot Water	100 ozs.
Ortol	½ oz.
Hydroquinone	1½ ozs.
Sulphite of Soda (Desiccated)	7½ ozs.
Carbonate of Soda (Desiccated)	12½ ozs.
Bromide of Potassium (Crystals)	38 grs.

886. **Note.**—Where only crystals of sulphite of soda and carbonate of soda can be obtained, double quantity must be used.

887. The above bath may be rendered non-abrasive by addition of 5 grains of commercial iodide of potassium to each ounce of stock solution.

888. These concentrated developers will keep indefinitely in filled bottles well stoppered.

889. **Manipulation.**—Use one part stock solution to four parts water for prints from normal negatives, but remember that full control of contrast is secured by varying the dilution of the developer. *The stronger the developer, the softer the print will be.*

890. Previously, under the heading of Paragraph 816, iodide of potassium is mentioned as a preventive of abrasion marks. This chemical has another property, that of reducing contrast; therefore, the softest prints possible will be

secured in undiluted stock solution, to which iodide of potassium has been added, as per directions.

891. **Developing.**—*Immerse the print, face up,* in the developer, being sure that it is quickly and evenly covered by the solution. The time of development should not exceed one minute, and as soon as the image reaches the desired point the print should be dipped in water for a second to remove the greater part of the developer. Then immediately transfer it to the acid fixing bath, where thorough immersion should be secured to prevent stains caused by uneven fixing. Fix for at least fifteen minutes. Longer immersion will do no harm.

892. **Acid Fixing Bath.—**

Water	1 gal.
Hyposulphite of Soda	2 lbs.

893. When thoroughly dissolved add 13 ounces of hardening solution prepared as follows:

Water	20 ozs.
Sulphite of Soda (Desiccated)	2 ozs.
Glacial Acetic Acid	3 ozs.
(Or 12 ozs. of Commercial Acetic Acid.)	
Powdered Alum	4 ozs.

894. All washing should continue for an hour in running water, or in ten changes of water, permitting prints to remain in each change five minutes. To prevent curling place the prints face down on cheesecloth stretchers. When they have become surface dry (not bone dry) pile them face down and continue drying, under pressure.

895. **Sepia Tones on Nepera Paper.**—The sepia tones by re-development of Nepera paper can be accomplished with the prepared re-developing solution or may be prepared according to the formula given in Paragraph 848.

896. **Practice Work.**—Nepera products are prepared especially for portrait work and while this paper is made in different grades, it is intended for use with medium strength negatives; which means that the average studio-

made negative will yield good prints on it. There are different surfaces of this product, but only two weights—single and double. The heavy, or double weight, is intended to take the place of platinum paper. This grade may be printed with a large margin and delivered unmounted, or may be tacked only at the upper edge and mounted in folders.

897. For first work, we advise using medium rough, single weight. After becoming familiar with the use of the material, double weight will appeal to you for special purposes. Make test prints on each, preserving them and noting all data on the back pertaining to the manipulation, filing these prints for future reference.

Note.—Olive tones can be secured by adding to every 15 ounces of regular developer, ½ ounce salt-bromide solution, prepared as follows:

Water	9 ozs.
Bromide of Potassium	½ oz.
Salt	½ oz.

If more olive is desired add more salt-bromide solution.

The salt-bromide has also a tendency to produce contrast, therefore should be used cautiously, especially when printing from strong negatives.

Royal Nepera.

(*1909 Supplement*)

Royal Nepera is coated on heavy weight stock, and made in two colors—mellow tone and pure white. The mellow, or India tint, paper is specially adapted to sepia tones by re-development. The Royal Pure White is a new product of the Eastman Company, with very commendable new qualities. Chemically, it is everything that can be desired. Its degrees of gradation and contrast are pitched in just the right key to suit the average professional negative. Furthermore, its latitude is such as to provide very good prints from negatives that are above or below the average degree of contrast. As black and white it is beautiful in texture and gradation. When normally exposed and developed it gives a blue black tone.

If a little more olive tone is desired, prepare the following solution:

Bisulphite of Soda.....1 oz.
Water ..... 6 ozs.

Use 1 oz. of this stock solution to every 20 ozs. of the regular developing solution. Give a normal exposure and develop in the usual way.

When the Royal White Nepera Paper is sepia toned by re-development, it preserves an exceeding richness of color. It has the same breadth and softness so much admired in the India tint Royal, but with an added sparkle that the pure white stock gives to the high-lights. Normally, when re-developed, Royal Nepera Pure White will give a tone which may be described as cold sepia. If a warmer print is desired, **potassium iodide** should be placed in the developer in which the black and white prints are made. The color of the print in the black and white is all important for the re-developing. A blue black print will give a cold sepia tone when re-developed, while a warmer sepia print will be the result if there is any trace of green in the shadows. The yellowish tone is disagreeable, but if iodide is used as suggested above, very pleasing results are secured, particularly if the prints are waxed when dried. The re-developed prints sometimes blister when thrown from the re-developer into the wash water, particularly if the wash water is quite cold. If between re-developing and washing, the prints are put in a hardening bath for five minutes, there should be no blisters. This hardening bath is composed of one part hardener to sixteen ounces of water. Formula for this hardener is given in paragraph 893. Expose the print so that it will require about 40 to 50 seconds to develop.

Royal Nepera is practically a double weight paper, and will lie reasonably flat, even when dried on cheese-cloth stretchers, while if surface dried between blotters and then placed between cardboard, under weight, they will come out flat and stay so. Royal papers are printed and developed the same as the light weight Nepera products.

CHAPTER XXXIV.

Cyko Gaslight Paper.

898. **Surfaces and Grades.**—Cyko is made in five surfaces and three grades. The surface is represented by the number on the end labels, the grade by the color of the label. In each grade will be found a variety of surfaces. Choose the surface most suitable and which will harmonize with the subject of the picture. Select the grade according to the quality of the negative. A weak or thin negative lacking in contrast, requires a contrasty paper, such as Blue Label Cyko. For a normally exposed and developed negative use Yellow Label Cyko. For contrasty negatives use Brown Label Professional Cyko. The last named, however, is intended principally for photographers who have the necessary experience and knowledge to handle a soft-working paper.

899. **Surfaces, Weights and Grades of Cyko.**—
Cyko No. 1 is matte surface.
Cyko No. 2 is semi-matte surface.
Cyko No. 3 is glossy surface.
Cyko No. 4 is rough surface.
Cyko No. 6 is studio (velvet surface).

900. **Grade and Color of Label.**—
Blue Label indicates contrast.
Yellow Label indicates normal.
Brown Label indicates professional (for soft effects).

901. **Double Weight.**—Double weight Cyko is furnished in semi-matte, studio, rough and glossy surfaces, and contrast, normal and professional grades. Double weight papers require no mount.

902. **The Selection of Light.**—Cyko prints, like other gaslight papers, may be made by using daylight for exposure. Select a north window, if possible, as the light from this direction will be more uniform. The paper, being quite sensitive to daylight, should be handled in subdued light, as otherwise it might fog. Proper precaution should be taken to pull down the window shades and darken the room sufficiently during manipulation. If the light is too strong for printing, it should be diffused or subdued by the use of several thicknesses of white tissue paper. Daylight is extremely variable, and for that reason the use of artificial light is recommended, as it varies less in intensity.

903. The Welsbach light is usually preferred to other illuminants, on account of its great intensity. The mantle should be in good condition and the gas pressure uniform, so that the light will vary in intensity as little as possible.

904. When gaslight is used for printing, a very convenient arrangement is a by-pass valve which controls the supply of gas to the burner. When this valve is closed only enough gas passes to keep the burners lighted, and the exposure is made by opening the by-pass when the exposure is to be made. This arrangement can be still further simplified by having a spring to close the by-pass, and a cord to open it when ready to make an exposure.

905. Ordinary gaslight, while not as strong as the Welsbach light, has the advantage of being more uniform, if the quality of the gas does not vary. With the Welsbach light the intensity depends, to a large extent, on the condition of the mantle. Ordinary gaslight is satisfactory and convenient for printing, especially for small negatives up to and including 4 x 5. Larger negatives, particularly if they are at all dense, require too long an exposure.

906. The light from a kerosene lamp is also satisfactory. A large, round-wick kerosene lamp gives nearly the same quality of light as a flat flame gas burner. The wick must be well trimmed, and the flame should be kept always at the same height when printing.

907. For the professional who has a large number of prints to make daily—especially the commercial photographer—the Cooper-Hewitt light (mercury vapor) possesses decided advantages. The Cooper-Hewitt Company sell a set of lamps for this purpose. When using the Cooper-Hewitt lamp, a good method is to partition the room, to have the lamp enclosed, cutting out a square opening in the partition. When development is in progress, by means of a carriage arrangement, this opening can be covered with a piece of postoffice paper, or orange glass, and uncovered when an exposure is to be made.

908. **Printing Cyko Paper.**—We will assume that the printing is to be done by artificial light, and, in order to secure an even illumination, it is necessary that the printing frame be placed at the proper distance from the light. A large negative should be printed at a greater distance from the light than a small one, so that its greater area may be properly illuminated. The usual rule is to print at a distance at least as great as the diagonal of the negative. Thus, a 4 x 5 negative should not be printed nearer than 6½ inches from the light; an 8 x 10 should not be printed nearer than 13 inches. Always place the printing frame so as to secure the full benefit of the light, thus obtaining even illumination.

909. **Necessary Exposure.**—It is not possible to specify any given time for exposure. The time necessary to print depends on the kind of light, the density of the negative, and the distance from the source of light. An exposure of 10 to 20 seconds, with a 16 candle power incandescent light, is usually sufficient for an average 4 x 5 negative, of the normal grade. The safest method is to use small strips for your first experiments. Place a strip over the most important part of the negative. Make the exposure, using judgment based upon the information given herein as to the distance from the light and the time of printing. Develop, and if not satisfactory try another strip, varying the time as indicated by the first results. When the desired effect is secured any number of prints may be

made from the same negative, and if the time of exposure, the distance from the light, as well as the time of developing are identical, all the prints should be equally good. By comparing the other negatives which are to be printed from with the one which has been tested, it will be possible to make a fairly accurate estimate of the time of exposure required for any negative.

910. **Developing.**—Cyko paper may be developed with any formula used for other gaslight papers, but the following formula will give good results:

911. **Formula No. 1.—**

Water, Soft or Distilled	32 ozs.
Metol	15 grs.
Sodium Sulphite (Desiccated)	1 oz.
Hydroquinone	60 grs.
Sodium Carbonate (Granular)	¾ oz.
Bromide of Potassium	3 grs.

912. Dissolve the chemicals in the order named, and remember that while the above amount of bromide is usually sufficient, it may at times be found that more of it must be added to produce clear whites. These chemicals dissolve in cold water, but more readily in warm water. If warm water is used the solution should be allowed to cool before using. This particular developer is suited for Blue Label Cyko (contrast grade), for Yellow Label Cyko (normal grade), or for Brown Label Cyko (professional grade). The stock solution should be diluted with an equal quantity of water.

913. Professional photographers who use developers in large quantities will prefer the following formula, which we will call Formula No. 2:

914. **Formula No. 2, Stock Developer.—**

Warm Water	128 ozs.
Metol	180 grs.
Sulphite Soda (Desiccated)	12 ozs.
Hydroquinone	1½ ozs.
Sodium Carbonate (Desiccated)	9 ozs.
Bromide of Potassium	33 grs.

915. Mix in the order named. Keep in well stoppered bottles. This developer will keep for a long time after dissolving, if placed in bottles filling them to the neck. Unless the bottles are completely filled the developer will not keep, as there will be sufficient air in the bottle between the developer and the stopper to spoil it.

916. For Blue Label Cyko (contrast grade), mix as follows:

Stock Developer.....1 oz.
Water.....2 ozs.

917. For Yellow Label Cyko (normal grade), and for Brown Label Cyko (professional grade), use the following:

Stock Developer.....1 oz.
Water.....3 ozs.

918. To both of the above formulæ it may be necessary to add a few drops of a 10% solution of bromide of potassium. It should be borne in mind that the tones of Cyko prints will vary according to the quantity of bromide used. When just enough bromide has been added to keep the highlights clear, the blacks take a bluish tinge. If more bromide is added and a test made after such addition, the tone will change gradually from blue-black to pure black, and upon addition of a still greater amount of bromide, it will turn to green, or brownish black. Hence, for olive and brown tones, increase the quantity of bromide and lengthen the exposure. If necessary, use more water in the developer. For blue-black tones and platinum effects, avoid over-exposure. Use less water in the developer and a minimum quantity of bromide.

919. The contrast or the soft effect of the prints will also be varied according to the quantity of bromide of potassium used. If an excess of bromide is used and the exposure is shorter, the contrast will increase. If, on the other hand, the quantity of bromide is decreased and the developer diluted with water, while at the same time the

exposure is increased, the prints will be softer. This applies to any grade of Cyko, whether Blue Label, Yellow Label or Brown Label.

920. **Note.**—*For softness in any of the grades of Cyko paper always increase the exposure and dilute the developer with water. The more dilution the softer will be the results, providing sufficient exposure has been given.* This is just the reverse to the manipulation of Velox.

921. For the amateur and others who do not care to compound their own developers, we recommend the prepared solutions.

922. **Cyko Liquid Non-Abrasion Developer.**—This developer has unique qualities which will appeal to the amateur. It is adapted to any grade of Cyko, but especially to Glossy Cyko No. 3, for the reason that it prevents abrasion marks, also called friction marks, to which all glossy developing-out papers are more or less susceptible.

923. There is still another feature which is of great moment, viz.: It serves as a guide to thorough fixing. The print is not absolutely fixed until the canary yellow color entirely disappears by fixing in a correctly prepared acid hypo bath. This developer should be used as follows:

924. **For Yellow Label (Normal) Cyko,** take

Cyko Concentrated Liquid Developer.....1 oz.
Water.....4 ozs.

925. **For Blue Label (Contrast) Cyko,** take

Cyko Concentrated Liquid Developer.....2 ozs.
Water.....4 ozs.

926. It is important that this developing solution, while in use, should be kept at a temperature between 65 and 70 degrees Fahr.

927. **Fixing.**—Any acid hypo bath used for gaslight papers may be also used for fixing Cyko papers, but the following formula may be employed. A sufficient amount

of the solution should be prepared to fix the prints thoroughly in 15 minutes, and acid hardener should always be added, as it will overcome the tendency of the fixing bath to cause blisters and even stains:

928. **Hypo Fixing Bath. Solution A.—**

Hypo.....12 ozs.
Water.....64 ozs.
Dissolve and then add:

929. **Solution B (Hardener).—**

Water.....5 ozs.
Sodium Sulphite (Powdered).....½ oz.
Acetic Acid No. 8.....3 ozs.
Alum (Powdered).....½ oz.

930. Acid hypo is also put up in prepared packages ready for dissolving. A 15 cent package of Cyko Acid Fixing Hypo Salts will make one pint of solution, which will fix two dozen 4 x 5 prints.

931. Any acid fixing bath can be used repeatedly. It keeps well, but will by degrees become alkaline through the gradual addition of developer, which adheres to the print and is carried into the fixing bath. The bath should be discarded entirely when it becomes muddy. If the fixing bath becomes exhausted it will be frothy, or suds will remain on the surface when it is violently agitated.

932. **Washing.**—Cyko prints are washed in the usual way. It is essential that the finished prints be washed thoroughly to free them from hypo. To wash a batch of one hundred 4 x 5 prints, using two trays of suitable size and transferring each print separately from one tray to the other, changing the water at least twelve times, will require at least a full hour for the process. If running water is used, where the prints can be kept constantly moving so that each individual print has a thorough washing, from one-half to one hour, according to the number of prints, will be required. Prints are not washed if they are piled in a bunch in a tray and the water simply runs in at

one end and out at the other. In some localities where there is an excessive amount of iron or impurities in the water, the whites in the prints may have a yellowish tone. The prints should not be allowed to wash longer than an hour, and should never soak in water over night, as this tends to soften the gelatin film and entirely spoils the print.

933. **Blisters.**—In order to avoid blisters the temperature of the wash water should be kept as uniform as possible. If the water is ice cold it will cause blisters. If running water is used for washing, the stream from the tap should not be allowed to fall directly upon the print, as this also will cause blisters. A good way to avoid this is to place a tumbler or small graduate in the tray used for washing, allowing the water to flow into this first and then over the side into the tray.

934. **Drying.**—After washing the prints as directed, remove them from the wash water and lay them face up on clean lintless blotters, care being taken to blot off the superfluous moisture. Another way, which is to be preferred when a large number of prints are to be dried, is to place them on a clean glass in a pile, face down. Cover them with a blotter, and with a squeegee roller press out all superfluous water. Then lay them out separately, face down, on cheese-cloth stretchers, which may be constructed by making a frame-work of light wood and tacking bleached cheese-cloth tightly over it. Prints dried in this manner will curl but slightly.

935. **Mounting.**—Cyko papers may be mounted in the usual way—the light weight papers mounted solid, while the double weight papers may be dried flat and placed in folders.

936. **Practice Work.**—Cyko paper is manipulated almost identically the same as Velox. There is some difference in the exposure required, but the principal difficulty lies in the manipulation in the developer.

937. With Velox paper when *softness* is desired *full strength developer* is used. Such is not the case with Cyko,

as with this product, when *softness* is wanted increase the *exposure* and *dilute the developer with water. Bear this in mind when manipulating this paper.*

938. The fact that Cyko is manipulated just the opposite to the Velox in the developer, makes the manipulation more interesting after having worked Velox paper. It gives an opportunity to work with more thought and care and less mechanically. It trains you to work any gaslight paper, it teaches you to exercise care, and it also enables you to thoroughly study and learn to understand the nature of each standard photographic product.

939. Make test prints in the usual manner. The first experiments may not be as successful as desired, but this will prove of benefit as you will then learn to manipulate the bath to give the results wanted. If you happen to fail with the first efforts, consult the difficulty department where the remedy will be found. Save test print failures as well as the successful ones and note the method of procedure on the back of all prints, filing them in the proof file for future reference.

CHAPTER XXXV.

Difficulties—Cyko Gaslight Paper.

940. **Impure or Grayish Whites.**—Lack of bromide in the developer—add a few drops of a 10% solution of bromide to the developer. Under-timed prints which have been forced in the development. Or, possibly the paper has been fogged by having been brought too near the light while the printing frame was being loaded, or when the paper was developing.

941. **Greenish Tones.**—A developer too weak or too old; too much bromide in the developer; oxidized developer; or over-exposure. Use a more concentrated developer, or add less bromide. A strong and fresh developer permits the use of more bromide than a weak one, without producing greenish black.

942. **Brown Tones.**—When the brown tones show, while the print is in the developer, it may be due to over-exposure and an excessive amount of bromide, or an old or incorrectly compounded developer. If the brown tone appears after immersion in the fixing bath, it may be traced to impure sulphite of sodium, or to too warm a fixing bath.

943. **Contrasty Prints (Lacking in Detail).**—If negatives are too harsh, use Normal or Professional Cyko, which works softer than the Contrast grade. A softer effect may be obtained with any grade of Cyko by increasing the exposure, or using a more dilute developer, or both.

944. **Weak Prints (Lacking in Detail).**—Under-exposure (indicated by the necessity of forcing development).

945. **Flat, Muddy Prints.**—Over-exposure. Negatives too thin or too weak. Use Contrast Cyko, which is more contrasty than Normal or Professional Cyko. The trouble may be due in some cases to the developer being too weak.

946. **Prints That Are Too Dark.**—Over-developed. (See also Grayish-Whites.) Remove prints from the developer sooner.

947. **Yellow or Brown Stains.**—The developer has not covered the print uniformly; or too long a time has elapsed between developing and fixing; or the prints were not kept in motion when

first immersed in the fixing bath. Staining all over the print is the result of trying to force the development of under-timed prints, or using a developer too weak, or too old. The print may not have been fixed or washed sufficiently. In some cases it is due to the fact that the water contains too great a proportion of iron. It is easy to determine when the trouble is due to incomplete fixing, because the print will have a sweet taste. Always rinse prints before fixing. We may here remark that one of the most common troubles met with in printing gaslight paper is staining; but this difficulty is seldom present when making Cyko prints, unless the worker is extremely careless.

948. **Round Dark Spots.**—Air-bells on print while in the fixing bath. The print should be completely immersed in the acid hypo bath and kept in motion during the first few seconds after immersion.

949. **Blisters.**—The printing frame has been placed too near the source of light. This would be indicated if the negative felt rather warm to the touch when taking the print out. In this event, the print should be allowed to cool off before developing. Prints may have been creased or broken while washing. Do not allow the water to run directly on the print from the tap. Too great a variation in temperature between the different solutions and the wash water may also be responsible for this trouble. It may also be due to an insufficient quantity of acid in the fixing bath. The fixing bath must be kept acid. It must be borne in mind that each print going from the developer into the fixing bath carries a certain amount of the alkali contained in the developer, which in time will neutralize the acid. Prints will sometimes blister when not allowed to remain in the fixing bath long enough to harden the film. The surface of the print when removed from this bath should not be slippery to the touch.

950. **Impure Chemicals.**—It is easy to ascertain when the fixing bath is not in proper condition, by wetting the thumb and index finger in the fixing solution. If the two fingers do not slip easily when rubbed together, the fixing solution is right.

951. **Discoloration Around Edge of Prints.**—If the centre of the print is clear, it indicates that the paper has been kept in a place exposed to chemical emanations, such as ammonia vapors, illuminating gas, gas from a furnace or stove, or fumes from turpentine or sewer gas. The package of paper must be kept tightly closed when not in use.

952. **Curling and Cracking of the Surface.**—The paper has become too dry. It should not be kept in a hot, dry place. The trouble may be overcome by soaking the prints for a few minutes

in a bath consisting of one ounce of glycerine and twelve ounces of water. Then dry the prints without washing them again.

953. **Round White Spots.**—Some opaque substance between the paper and the negative when printing; air bubbles remaining on the surface of the paper while in the developing solution—the bubbles should have been removed with the finger during development. White deposit all over the surface of the prints is caused by milky hypo bath—if washed thoroughly, it can be removed.

954. **Black Surface Marks or Scratches.**—This occurs principally with glossy paper, and is the result of pressure or friction before development. These marks can be removed from the dry print by rubbing with a tuft of cotton dipped in wood alcohol. This trouble may be made absolutely impossible by using Cyko Liquid Developer (Non-Abrasion).

955. **Canary Yellow Color Produced When Cyko Liquid Non-Abrasion Developer Has Been Used.**—A sign that the print has not been fixed sufficiently. The canary color should disappear entirely when properly fixed in a correctly prepared acid hypo bath.

956. **Freaks.**—Picture develops irregularly, and appears to be covered with greasy streaks and finger marks, giving the impression that they are spots on the paper which have never been coated. It is annoying to the photographer, because he feels sure that the fault is in the paper, which is not so. These freaks occur most frequently in warm weather when the humidity is great, and are due to the fact that the paper absorbs moisture unevenly, and becomes repellant in certain spots to the action of an *incorrect* developer.

CHAPTER XXXVI.

Artura Developing or Gaslight Papers.

Detailed Instruction.

957. **Negative Quality.**—"Artura" is the original contact developing paper that will register the values of a negative, such as regularly made for printing-out papers. The advantage of this quality can readily be appreciated, as it enables the professional photographer to take up the developing process without having to modify or change his methods of negative making. The necessity of making a special negative for a printing process is a serious proposition. The photographer may be well grounded in a method of making satisfactory negatives, but to change in order to accommodate a paper upsets an entire experience and manner of skylight and dark room work. The most desirable negative is one of medium density and contrast. A thin flat negative is no more desirable than a harsh contrasty one. Fully timed negatives, not over developed, will prove the best printers. The color of a negative is also important. A slight yellow color, as is generally obtained with pyro, is not objectionable, but too much of it should be avoided, as it slows the printing and increases the contrast of the negative.

958. The following table gives the speed of the different brands of "Artura" with negatives of medium density; also the printing contrast of each brand:

Brand.	Speed.	Contrast.
Iris	Regular	Soft
Carbon Black	Fast	Soft
Carbon Green	Slow	Soft
Chloride	Regular	Soft
Non-Curling	Regular	Hard, Medium and Soft

FAST SPEED.—10 seconds exposure one foot from 16 candle-power incandescent light.

REGULAR SPEED.—30 seconds exposure one foot from Welsbach gaslight.

SLOW SPEED.—20 to 30 seconds exposure with daylight.

959. **Printing Lights.**—For printing the fast paper, yellow artificial light, such as oil lamp, ordinary gaslight, incandescent electric light, etc., is suitable. Weak subdued daylight may also be used. For printing the slower papers, a white or actinic artificial light may be used, such as Welsbach gas light, diffused arc light, Cooper-Hewitt light, etc. Diffused daylight is also suitable. For printing the slowest paper, use the direct rays of an arc lamp, or north daylight.

960. The two most widely used brands of "Artura," are "Iris" and "Carbon Black."

961. "Carbon Green" and "Chloride" are also excellent papers, simple in manipulation, producing prints of fine quality.

962. Carbon Green Artura produces excellent green carbon effects with regular developer and without special treatment of any kind. Its printing quality makes it very suitable for portraiture, and for landscapes and marines it is unequaled. It possesses soft printing quality and is best adapted to the stronger grades of negatives.

963. Artura Chloride is a paper simple in manipulation, and is intended to produce soft, artistic effects without lustre.

964. **Manipulation of Iris Paper.**—"Iris" is of exceptionally fine printing quality and possesses all of the finer points of quality and tone necessary for the better grades of contact printing. This brand is especially recommended for portraiture, and in fact all work where quality, gradation and tone values are required. With its three surfaces all of the most desirable photographic effects may be obtained. Iris paper is made in three surfaces and two weights.

965. Regular Weight. For mounting. Smooth lustre surface. (See 1909 REVISION ON PAGE 293.)

Extra Heavy. Does not require mounting or backing. Smooth surface without lustre.

Medium Rough. Heavy stock with light grain.

966. The speed of Iris paper permits handling it in ordinary yellow artificial light without the use of red or orange light screen.

967. **Exposure.**—The length of exposure of course depends on the density of the negative; also the strength of the light used for printing. After becoming familiar with the speed of the paper all that is necessary is to judge the density of different negatives. For the beginner, a test should be made by covering some important part of the negative with a small strip of paper and exposing it to the light. When exposure is thought to be sufficient, remove the test strip and develop it. If the exposure is correct, the image will develop to the desired depth and pause in development. If the image stops developing before the desired depth is reached, it will indicate under exposure. If the image develops beyond the desired depth before development stops, it will indicate over exposure.

968. **"Iris" developer** should be mixed according to the following formula. Other developers may be used (see general information), but we recommend the following as giving good color and gradation:

Water	40 ozs.
Metol	14 grs.
Sulphite of Soda (Dry)	½ oz.
Hydroquinone	60 grs.
Carbonate of Soda (Dry)	½ oz.

969. When ready to develop add one drop of a saturated solution of bromide of potash to each two ounces of developer. Chemicals should be dissolved in the order given, thoroughly dissolving each one before adding the next. If sodas in crystal form are used, double the amount given in the above formula.

970. The dry print should be immersed face up in the developer with a sliding motion. Break air-bells that may

form by rubbing the surface with the tips of the fingers, or a tuft of cotton.

971. A properly exposed print will develop to the desired depth freely without forcing the development. The deeper shadows of the image appear first, and as development proceeds, the half-tones and highlights will build in. The image will appear shortly after the print is immersed in the developer. The development will proceed evenly and slowly enough to give full control during development. The speed of development depends largely on the temperature of the developer and the quality of chemicals used in the developer. The best temperature for developer is about 65 degrees Fahrenheit.

972. When a print is completely developed it will apparently stop or pause in development. If a print is under-exposed and over-developed, or forced, it will be cold or blue in tone, lacking richness in the shadows and detail in the highlights. Forced development is also apt to cause impure or fogged whites. If a print is over-exposed and under-developed, it will have reached the desired depth before development has paused or stopped. An under-developed print will be harsh, lacking detail in both highlight and shadow. Extreme over-exposure will result in a flat muddy print.

973. The developer formula, as previously given, will prove satisfactory for the ordinary run of negatives, but in extreme cases it can be modified to advantage. When negatives are inclined to be flat or weak, the amount of hydroquinone should be doubled. This together with full exposure will increase the brilliancy of the print. By "full exposure," slightly over normal is meant. For contrasty negatives, use regular developer with double the regular amount of bromide, adding one drop of the following iodide solution to each ounce of developer.

IODIDE SOLUTION.

Water.....4 ozs.
Iodide of Potash Crystals.....1 oz.

974. More or less iodide will produce similar degrees of contrast. Care should be taken in the use of iodide, as when the quantity is beyond a certain point it will act to the extreme. Expose prints long enough to print through the highlights of the negative. Iodide will take care of the shadows in the print and prevent them from becoming too intense. The best tones on "Iris" are obtained by making decidedly olive tones and then toning as directed hereafter. To obtain the necessary olive in the prints they should be exposed so that they will develop to the proper depth without forcing. Bromide of potash is important in producing olive tones, and at least as much as is called for in the developer formula should be used. Local water conditions may make it necessary to use an increased amount of bromide to obtain the necessary olive. Using one drop of nitric acid to each ounce of developer will also assist in producing the olive tone.

975. After prints are developed rinse in acid short-stop.

ACID SHORT-STOP.

Water	32 ozs.
Commercial Acetic Acid	1 oz.

976. The exact proportion of the short-stop is not important, but this bath should be kept acid at all times, because only as long as it remains acid will it act as a short-stop. Carrying developer into it with prints will in time neutralize it. It is easily mixed and should be kept fresh. After rinsing prints, transfer them immediately to the fixing bath and be sure to quickly and thoroughly immerse the prints in the solution.

977. Fix prints face up to prevent air-bells from forming on the surface of the print. Air-bells in fixing cause round dark spots, or streaks, to appear on the print.

FIXING BATH.

Water	64 ozs.
Hypo	16 ozs.

Dissolve and add the following hardening solution:

Water	5 ozs.
Sulphite of Soda (Crystals)	½ oz.
Commercial Acetic Acid	3 ozs.
Powdered Alum	½ oz.

978. It is important to mix fixing bath exactly as given. This bath will keep indefinitely and can be used repeatedly until exhausted. A 64-oz. bath will fix at least two gross of cabinet size paper. When fixing bath is exhausted a clouded sediment will appear, and the bath will be frothy when violently agitated. Prints must be fixed no less than 10 minutes nor more than 30 minutes. (See instructions for fixing prints, Chapter XXXVII, General Information.) After prints are fixed, they may be rinsed in fresh water and should then be toned. The decided olive color is converted into a proportionate amount of brown in the toning bath. In this way, pleasing brown black tones are obtained. Unless prints are decidedly olive, the toning bath will have no apparent action. (See Development.)

979. **Toning Bath.—**

Boiling Water	128 ozs.
Hypo	16 ozs.
Alum	4 ozs.
Sulphate of Soda (not Sulphite)	8 ozs.

980. The hypo and alum should be dissolved while water is boiling hot, and after it is cool add sulphate of soda. This bath will be milky in appearance, having a white precipitate. It may be used this way, or allowed to settle, pouring off and using the clear portion. A new bath may show a tendency to bleach, and to overcome this it should be ripened with silver. A convenient method of ripening is to put some unused pieces of photographic

paper, containing silver, in the bath previous to toning. After the bath ripens it can be used repeatedly until it refuses to tone. It will take from 15 to 30 minutes to tone prints, but they need no particular attention after they are thoroughly and evenly saturated with the bath. If the bath is very cold, or after it becomes old, it will work more slowly. To hasten its action it may be warmed slightly. Never use it at a temperature of more than 90 degrees Fahrenheit, or the action will be too rapid and difficult to control. The toning may be done in daylight. Prints should only be toned far enough to remove the decided olive color. It is advisable to leave a slight trace of olive in the print, as this disappears in drying, leaving a brown black tone. Do not over tone, or the prints will be blue black instead of brown black. After prints are toned, separate well in running wash water and wash for one hour. If running wash water is not available, it will be advisable to put prints back in the fixing bath to check the toning action. Then wash.

981. **Note.**—If the tone of the print is satisfactory after being fixed, the use of the toning bath may be omitted. The purpose of this bath is to change the olive to a brown black and is NOT a necessary part of the process for those who want the olive black tone. If difficulties arise look under head of "General Information" for suggestions. For instructions in regard to mounting and drying, also consult text under the above head.

982. **Sepia Tones on Iris.**—Beautiful sepia tones can be obtained upon Iris paper by toning in a toning bath mixed according to the formula given in paragraph No. 979. Iris prints intended to be toned sepia should be made in the ordinary way, and a shade darker. Fully and evenly developed prints give the best tones. It will take from 8 to 12 hours to convert prints to a full sepia, if the bath is used cold. Using the bath at a temperature of 100 degrees Fahrenheit will tone prints in about 30 minutes. Prints need no particular attention, as the toning proceeds to the sepia point and then stops. If a cold bath is used, prints

may be allowed to remain in it over night. The only precaution necessary is to stir prints occasionally during the first stages of toning. After they are thoroughly and evenly saturated with the toning bath, they will need no further attention. Prints should be toned face up.

983. **Spots.**—Untoned spots are caused by not thoroughly and evenly immersing the print in the toning bath, or by air-bells forming on the surface of the print during toning. Air-bells may be avoided by toning prints face up. It is important to observe the directions in regard to fully and evenly developing prints. Prints that are over-exposed and not fully developed will be flat and of a yellowish color when toned.

984. **Manipulating Carbon Black Paper.**—Carbon Black is the fastest chloride paper made, requiring handling in red or orange light to avoid fogging. It possesses remarkable latitude of exposure and will adapt itself to a wide range of negatives. It is at its best when used with the stronger grades of negatives. Carbon Black is made in five surfaces and two weights:

Glossy—Regular Weight—High gloss surface.
Studio Special—Regular Weight—Smooth half-matte surface.
Matte—Regular Weight—Slight grain with slight lustre.
Dead Matte—Regular Weight—Smooth surface without lustre.
Rough Matte—Double Weight—Broad rough grain with slight lustre.
Extra Heavy—Double Weight—Smooth half-matte surface.

985. **Exposure.**—The speed of Carbon Black makes it possible to print it with an oil lamp, ordinary gas light, or incandescent electric light. The length of exposure of course will depend on the density of the negative, also the strength of the light used for printing. For the beginner a test should be made by covering some important part of the negative with a small strip of paper and exposing it to the light. When exposure is thought to be sufficient, remove the test strip and develop it. If the exposure is correct, the print will develop to the proper depth and stop.

Prints should be timed so that they develop to the proper depth without forcing the development. If prints stop developing before the desired depth is reached, it will indicate under-exposure. If development proceeds beyond the desired depth, it will indicate over-exposure.

986. **Carbon Black developer** should be mixed according to the following formula. Other developers may be used (See "General Information"), but we recommend the following as giving good color and gradation:

Water	20 ozs.
Metol	14 grs.
Sulphite of Soda (Dry)	½ oz.
Hydroquinone	60 grs.
Carbonate of Soda (Dry)	½ oz.

987. When ready to develop add one drop of a saturated solution of bromide of potash to each ounce of developer. Chemicals should be dissolved in the order given, thoroughly dissolving each before adding the next. If sodas in crystal form are used, double the amount given in the above formula. Carbon Black prints may be placed in water previous to development, but this is not necessary. Prints should be immersed quickly and evenly in the developer, removing air-bells that may form on the surface of the print by rubbing the surface with the tips of the fingers, or a tuft of cotton.

988. A properly exposed print will develop to the desired depth freely without forcing. The image will appear shortly after the print is immersed in the developer and development will proceed evenly and slowly enough to give full control during development. The speed of development depends on the temperature of the developer, the quality of chemicals used in the developer, etc. The best temperature at which to use developer is about 65 degrees Fahrenheit.

989. When a print is completely developed, it will apparently stop or pause in development. If a print is under-exposed, over-developed, or forced, it will be cold or

blue in tone and lack richness in the shadows and detail in the highlights., Forcing the development is also apt to cause impure or fogged whites. If the print is over-exposed and under-developed, it will have reached the desired depth before development has stopped. An over-exposed and under-developed print will be inclined to be flat in general appearance.

990. Developer formula, as given, will prove satisfactory for all negatives. The contrast of Carbon Black paper can be controlled by varying the exposure. To obtain contrast from flat negatives, expose farther from the source of light, and do not over-expose. Soft prints from hard negatives may be obtained by exposing near the source of light and giving full exposure. After prints are developed, rinse in fresh water and transfer immediately to the fixing bath. Fix prints face up to avoid air-bells. For fixing bath and method of fixing see Paragraph 977-978.

991. After prints are fixed wash in the usual way in running water for about an hour. If difficulty arises, look under head of General Information for suggestions. For instructions in regard to mounting and drying see General Information, Chapter XXXVII.

992. **Note.**—The speed of Carbon Black paper makes it suitable for enlarging purposes, the resulting prints having a richness and depth unequaled by any of the bromide papers. For enlarging, use an arc lamp and condensing lenses.

993. **Manipulating Carbon Green Paper.**—Beautiful green carbon effects by direct development. Made in three grades:

Matte—Regular Weight—Surface having slight grain and slight lustre.

Medium Rough—Heavy Stock—Rough surface with slight lustre.

Extra Heavy—Double Weight—Smooth half-matte surface.

994. Carbon Green is the slowest brand of Artura paper. It will require 20 to 30 seconds exposure to north

daylight with the average negative. Development may be carried on in yellow artificial light without danger of fogging. After becoming familiar with the speed of the paper, it is simply necessary to judge the density of the different negatives. For the beginner a test should be made by covering some important part of the negative with a small piece of paper and exposing it to the light. When exposure is thought to be sufficient, remove the test strip and develop it. If exposure is correct, the image will develop to the desired depth and stop. If the image stops developing before the desired depth is reached, it will indicate under-exposure. If development proceeds beyond the desired depth before development stops, it will indicate over-exposure.

995. **Carbon Green developer** should be mixed according to the following formula. Other developers may be used (see General Information), but we recommend the following formula:

Water	20 ozs.
Metol	14 grs.
Sulphite of Soda (Dry)	½ oz.
Hydroquinone	60 grs.
Carbonate of Soda (Dry)	¾ oz.

996. When ready to develop add one drop of a saturated solution of bromide of potash to each ounce of developer. Chemicals should be dissolved in the order given, thoroughly dissolving each before adding the next. If sodas in crystal form are used, double the amount given in above formula.

997. Prints may be wet in water previous to development. This, however, is not necessary. Immerse prints quickly and evenly in the developer, removing air-bells that may have formed, by rubbing the surface of the print with the tips of the fingers, or a tuft of cotton. A properly exposed print will develop to the desired depth and stop. The first action of Carbon Green paper in the developer is quick, after which the image builds up more slowly. Prints

should be timed, so they may be allowed to remain in the developer until development is completely stopped. Over-exposure and under-development will cause tones not as pleasing as those obtained by full development. If prints are too dark, give less exposure. The image will appear quickly and develop about half way. The development will then pause and proceed slowly to the stopping point.

998. When a print is completely developed it will stop in development. If a print is under-exposed and over-developed, or forced, it will lack richness and also be apt to have impure or fogged whites. If a print is over-exposed and under-developed it will have reached the desired depth before development has stopped. An under-developed print will be muddy in general appearance. To obtain the best color or tone on Carbon Green paper it is important to observe the foregoing suggestions in regard to giving prints full development. The developer formula, as given, will prove satisfactory for the ordinary run of negatives. When negatives are inclined to be flat, the contrast of the paper can be increased to a certain extent by using additional bromide of potash in the developer. Normal and contrasty negatives will produce excellent prints on Carbon Green paper without special treatment. After prints are developed, rinse in water and transfer immediately to the fixing bath. Be sure to quickly and thoroughly immerse the print in the fixing bath. Fix prints face up to prevent air-bells from forming on the surface of the print. (See Paragraphs 977 and 978 for fixing bath formula).

999. Fix prints about 10 minutes, or until the yellow color is removed from the film. Prolonged fixing should be avoided, as it sometimes affects the tone of the print. After prints are fixed, wash as usual for one hour in running water. If difficulty arises look under head of General Information for suggestions. For instructions in regard to mounting or drying see General Information.

1000. **Manipulating Artura Chloride Paper.**—Soft artistic effects without lustre, made in three surfaces:

Heavy Smooth — Double Weight — Smooth surface without lustre.

Medium Rough—Heavy Stock—Slight pebble surface without lustre.

1001. The speed of Chloride paper permits of it being handled in ordinary, yellow artificial light, without the use of a red or orange light screen.

1002. **Exposure.**—The length of exposure, of course, will depend on the density of the negative; also the strength of the light used for printing. After becoming familiar with the speed of the paper, it is simply necessary to judge the density of the different negatives. For the beginner, a test should be made by covering some important part of the negative with a small strip of paper, exposing it to the light. When exposure is thought to be sufficient, remove the test paper and develop it. If the exposure is correct, the image will develop to the desired depth and pause in development. If the image stops developing before the desired depth is reached, it will indicate under-exposure. If the image develops beyond the desired depth before development stops, it will indicate over-exposure.

1003. **Chloride developer** should be mixed according to the following formula. Other developers may be used (see General Information), but we recommend the following formula:

Water	20 ozs.
Metol	14 grs.
Sulphite of Soda (Dry)	½ oz.
Hydroquinone	60 grs.
Carbonate of Soda (Dry)	½ oz.

1004. When ready to develop, add one drop of a saturated solution of bromide of potash to each three or four ounces of developer. Chemicals should be dissolved in the order given, thoroughly dissolving one before adding the

next. If sodas in crystal form are used, double the amount given in above formula.

1005. The dry print should be immersed face up in the developer with a sliding motion. Remove air-bells by rubbing the surface of the print with the tips of the fingers, or a tuft of cotton. A properly exposed print will develop to the desired depth freely, without forcing. The image will appear shortly after the print is immersed, and development will proceed to the proper depth, pause or stop; allowing uneven places caused by air-bells, or the developer not covering the print evenly, to "catch up." The speed of development depends largely on the temperature of the developer. The best temperature at which to use the developer is about 65 degrees Fahrenheit.

1006. When a print is completely developed, it will apparently stop, or pause in development. If a print is under-exposed and over-developed, or forced, it will be cold or blue in tone and lack richness in the shadows and detail in the highlights. Forcing development is also apt to cause impure, or fogged, whites. If a print is over-exposed and under-developed, it will reach the desired depth before development has paused or stopped. An under-developed print will be harsh, lacking detail in both highlight and shadow. Extreme over-exposure will result in a flat, muddy print.

1007. The developer formula, as previously given, will prove satisfactory for the ordinary run of negatives, but in extreme cases it can be modified to advantage. When negatives are inclined to be flat or weak, the amount of hydroquinone should be doubled. By increasing the amount of metol in the developer and reducing the amount of hydroquinone, soft prints from harsh negatives may be obtained. After prints are developed, rinse in acid short-stop. (See Paragraphs 975-978 for formula of short-stop bath and general instruction for fixing, etc.)

1008. **Artura Backing Paper. Chemically Pure.**—For use with Artura papers. DIRECTIONS. The backing paper should be wet. Prints should also be wet. Paste

the raw stock side of the backing paper on the back of the print, roll down and dry between blotters or on tins or glass. If tins or glass are used for drying, the gelatin side of the backing paper should be placed in contact with them, leaving prints face up. In this way the surface of the print is not changed. When glass is used, it should be dressed with a solution of benzine and paraffine, or some other suitable dressing, to prevent the possibility of prints sticking when dry.

1009. **Note.**—Glossy prints should be ferrotyped in the usual way, by placing the face of print in contact with the tins or glass.

1909 SUPPLEMENT

1009*a*. **Iris.** Grade A. Regular weight stock, smooth and semi-matte surface.

Grade B. Double weight stock, smooth, semi-matte surface.

Grade C. Double weight stock, smooth absolute matte surface (no lustre).

Grade D. Double weight stock, medium rough, absolute matte surface (no lustre).

Grade E. Double weight buff stock, medium rough, absolute matte surface (no lustre).

Grade A is used mostly for mounting on card mounts.

Grades B and C are used in folders and for work where solid mounting is not desired, although they may also be mounted solid.

The same applies to Grades D and E, and these grades, on account of their surface, are used to a great extent for the larger size pictures, and where broad, artistic effects are desired.

Grade E is coated on a buff-colored stock suitable for both black and white and sepia tones. The color of this stock is in perfect harmony with sepia, and very beautiful sepia effects are obtained by the use of this grade of Iris.

1009*b*. **Non-Curling Paper.** This brand is made in two surfaces—**Satin,** which is regular weight stock, having a smooth semi-matte surface, and **matte,** which is also of regular weight, but has an absolutely smooth matte surface

(no lustre). Both the Satin and Matte are made in three grades of contrasts—hard, medium, and soft. Non-curling is also furnished on heavy stock, which is known as extra heavy, as it is supplied on double weight paper. It has a smooth semi-matte surface. This latter grade is made in medium contrast only. *Non-curling post cards* are furnished in the same weight, surface and contrast as the extra heavy paper.

1009*c*. **Sepia Tones (Re-development).** Like all other photographic processes, the success of re-development depends on intelligent handling. It is of utmost importance that the black and white print intended to be re-developed be fully developed; *i. e.,* the silver in the print must be fully reduced. This requires that the original print be given normal exposure and allowed to remain in the developer until development is complete. A strong developer is best to use on prints intended to be re-developed, and care must be exercised in the use of potassium bromide, as too much will restrain the action of the developer and make it difficult to obtain full reduction or development. Develop the prints as far as they will develop without fogging the whites. Be sure the prints are well separated during fixing, to insure even and thorough action of the hypo. Then wash for one hour in running water, at the same time carefully handling the prints in order to eliminate all traces of hypo. Bleach in

BLEACHING SOLUTION.

Water	64 ozs.
Ferricyanide of Potassium (Red Prussiate)	½ oz.
Bromide of Potash	½ oz.
Aqua Ammonia	30 to 40 drops

Bleach prints until the last trace of black has disappeared from the densest shadows; then rinse in clear water until the excess of bleacher has been removed, and re-develop in

RE-DEVELOPER.

Water	32 ozs.
Sulphide of Soda (not Sulphite)	½ oz.

Prints will instantly re-develop to rich sepia in this solution, if directions have been closely followed. Wash for one hour and dry.

1009*d*. **Sepia Tones (Double Re-Development).** This process will produce a true sepia tone on Iris, also warmer or colder browns, as desired. The tone is easily controlled in the manipulation and all of the delicate gradations and fine quality of a black and white Iris print are pre-

served. Make Iris prints in the regular way, and after they are thoroughly and evenly fixed, wash to eliminate all hypo and bleach in

SOLUTION A.

Water	64 ozs.
Ferricyanide of Potash (Red Prussiate)	½ oz.
Bromide of Potash	½ oz.
Aqua Ammonia (stronger ammonia)	30 to 40 drops

Prints should be bleached until the last trace of black has disappeared from the deepest shadows. Longer immersion will do no harm, but is unnecessary. After prints are bleached they should be well separated in running water and washed for at least ten minutes, and should then be partially re-developed in

SOLUTION B.

Water	24 ozs.
Iris Developer	8 ozs.
Bromide of Potash (saturated solution)	20 drops

This is a weak developer and the tray should be rocked to insure an even action of this solution on the prints. In this solution the image will re-develop slowly and will first appear of a reddish color. For a good sepia tone, prints should remain in the Solution B until the last trace of red has disappeared from the deeper shadows and the print has a purplish appearance evenly over its entire surface. Prints should then be rinsed in Acetic Acid water (regular Short Stop) to instantly check the action of Solution B, and should be washed in running water for ten minutes and separated well during washing.

1009*e*. Re-development is then completed in

SOLUTION C.

Water	32 ozs.
Sulphide of Soda (not Sulphite)	½ oz.

Allow prints to remain in Solution C for about thirty seconds, until the action is complete; then wash for one-half hour and dry.

1009*f*. NOTES. The action of Solution A and Solution C is a complete action and does not require watching.

The action of Solution B determines the finished tone of the print. The longer the immersion in Solution B the colder will be the tone of the print when finished. This makes it possible to obtain any desired tone, and a few trials is all that is necessary to determine how far to carry prints in Solution B, to produce the desired sepia color in the finished print.

After determining this point and becoming familiar with the appearance of the partially re-developed image in Solution B, the process is mastered.

Solutions A and C are the same as those used in single re-development, and the departure in this process is the introduction of Solution B as a controller of tone.

Solution B is a weak developer and should not be overworked. Keep prints completely separated in Solution B to insure an even action on the entire surface of the print.

Be sure to rinse or wash and separate prints as directed between baths. Thoroughness in handling between baths is essential, and carelessness in observing this point may cause uneven spots and streaks in prints.

A separate tray should be used for the Sulphide Solution, and this tray should be used for no other purpose. All trays used in re-development should be clean.

The Sulphide Solution should be kept in a tightly corked bottle or it will lose its strength in a short time.

When handling good-sized batches of prints they may be run through Solutions A and C without relation to subjects. In Solution B each subject (all prints from one negative) should be run through one after another to insure uniform depth and tone. This suggestion makes it easy to produce each individual order uniform and without uncertainty.

CHAPTER XXXVII.

Artura Paper—General Information and Difficulties.

1010. **Fixing Prints.**—When fixing prints in large quantities, the following method may be used to insure proper fixing: Fix prints face up for about 10 minutes and then turn this particular batch face down. Continue fixing another lot of prints face up for another 10 minutes, and by this time the first batch will be ready to remove from the hypo. The last batch may then be turned face down, and by proceeding in this manner the various batches are easily kept separated. Prints should always be fixed face up, immersing them quickly and thoroughly in the fixing bath.

1011. **Mounting and Drying.**—Prints made on Artura paper are firm, and will not stick to blotters in mounting or drying.

1012. **Regular Weight.**—The regular weight papers may be mounted in the ordinary way from the wash water, or be dried and trimmed and then re-wet and mounted. Regular weight prints can also be backed with Artura Backing Paper. (See backing paper directions, paragraph 1008.)

1013. **Extra Heavy.**—Extra heavy papers may be delivered in folders, or enclosures. They will lay flat, if properly dried. Different methods of drying are used. Some one of the following will be found to be satisfactory:

1014. No. 1. Remove prints from the wash water and allow them to drain. Place them face down on some clean surface until nearly dry. Then lay between blotters, under pressure, until thoroughly dry. Changing the blotters occasionally will hasten the drying.

1015. No. 2. Proceed as in method No. 1 until nearly dry. Finish drying by running prints through a warm burnisher with a piece of cardboard to protect the surface. Prints dried in this manner may be shaped with a slight backward curl and will remain as shaped. This method may be used to advantage when prints are wanted for quick delivery.

1016. No. 3. Remove prints from the wash water and allow them to drain. Place face down on some clean surface until thoroughly dry. The back of the print should then be moistened by rubbing with a damp (not wet) sponge. It is important to dampen the entire back of the print to the edges, moistening it as evenly as possible. Prints should then be put between blotters, under pressure, until dry.

1017. **Backing Heavy Prints.**—Heavy weight prints intended for delivery unmounted can be backed with a light-weight linen paper without increasing the weight of the print. This will insure flat prints under most trying conditions. A paper suitable for this purpose is Onion Skin linen, which may be procured from any wholesale paper house and many retail book stores. Any strong light weight linen paper will answer the purpose. Prints are first dried flat between blotters. The light-weight linen paper is then cut the desired size, wet, pasted, and placed in position on the back of the dry print. Roll down and finish drying between blotters. The linen paper shrinks in drying and will counteract any curling tendency the paper may have.

1018. **Blotters.**—The life and usefulness of blotters is increased by keeping dry. Spread them out to dry when not in use.

1019. **Yellowish Stains.**—1. Weak or overworked fixing bath.

2. Under-exposure and forced development.

3. Not quickly and thoroughly immersing prints in the fixing bath.

4. Not rinsing in acid water between developing and fixing.

5. Unclean fingers will cause stains, and the hands should be rinsed often to keep them free from hypo while developing.

6. Unclean trays cause stains.

7. Iron in water, also other impurities. Use distilled or rain water for mixing developer.

1020. **Brownish Stains.**—1. Brown spots or stains are caused by using a fixing bath not properly mixed. (See fixing bath formula, paragraph 977.)

2. Brown stains on Iris paper may be caused by not properly mixing fixing bath, or by using a toning bath unripened. (See toning bath formula, paragraph 979.)

3. Not separating prints thoroughly in running wash water. Prints should be well separated in the wash water to insure the removal of chemicals as quickly as possible.

1021. **Pinkish Stains.**—1. Insufficient fixing. Prints not thoroughly fixed contain silver, which will immediately become discolored when exposed to daylight.

2. Lack of sufficient bromide of potash in the developer.

1022. **Grayish or Fogged Whites.**—1. Lack of sufficient bromide of potash in the developer.

2. Under-exposure and forced development.

3. Handling paper in unsafe light.

1023. **Dark Spots.**—1. Are caused by fixing prints face down, thus allowing air-bells to form on the surface of the print. These air-bells allow development to proceed. Fix prints face up.

2. Dark spots and streaks are also caused by failing to rinse prints in acid water between developing and fixing. Prints should be quickly and thoroughly rinsed after development and transferred immediately to the fixing bath.

1024. **White Spots.**—White spots are caused by air-bells forming on the surface of the print during development. Rubbing the surface of the print during that manipulation will break any air-bells that may form, and prevent this trouble.

1025. **Bluish Tones.**—Blue tones are caused by un-

der-exposure and forced development; also caused by lack of sufficient bromide of potash in the developer. At least as much bromide as is called for in the formula should be used, and if necessary the amount should be increased. The amount of bromide necessary varies on account of local water conditions, different makes of chemicals used in the developer, etc.

1026. **Muddy Tones.**—Extreme over-exposure will cause muddy tones and flat prints without vigor.

1027. **Irregular or Patchy Development.**—1. Over-exposure and under-development will cause an uneven appearance in the print.

2. Uneven development is another cause. Immerse prints evenly in the developer.

3. Not rinsing properly in acid water between developing and fixing will cause irregular spots and streaks.

1028. **Mixing Solutions.**—In mixing all solutions chemicals should be added to the water in the order given. There is a reason for all of the chemical combinations. If the local water is not fairly pure, it is advisable to use distilled, or rain water, as this can be depended upon.

1029. **Saturated Solution.**—To mix a saturated solution of bromide of potash, add sufficient bromide crystals to a few ounces of water, so that when it is thoroughly dissolved some bromide crystals will remain at the bottom of the bottle. The undissolved crystals prove the solution to be saturated.

1030. **Acid Water.**—Acid water for rinsing prints between developing and fixing cannot be too strongly recommended.

1031. **Acetic Acid.**—Do not use acetic acid C. P., as it is too strong.

1032. **Other Developers.**—Metol-hydroquinone has proved to be an excellent developer and can be depended upon for results when mixed in the proportions given in the formula. Its keeping quality is also excellent. Ortol-hydroquinone developer is rapidly coming into favor, as it

apparently equals metol-hydroquinone in every respect. Following is a formula which may be used:

1033.

Water	40 ozs.
Ortol	30 grs.
Sulphite of Soda (Dry)	1 oz.
Hydroquinone	90 grs.
Carbonate of Soda (Dry)	1 oz.

Use bromide as necessary to insure clear whites.

1034. The following formula for amidol developer will also produce good results. Amidol does not keep well in solution and should be mixed and used as needed:

Water	4 ozs.
Sulphite of Soda (Dry)	40 grs.
Amidol	10 grs.

Use bromide as necessary to insure clear whites.

1035. **Action of Chemicals on Paper.**—Developing agents such as metol-hydroquinone, ortol, amidol, etc., are used to develop the image. Sulphite of soda is used as a preservative in the developer. Carbonate of soda is used to open the pores of the paper, allowing developing agents to act freely and evenly. Increasing the amount of carbonate increases speed of development. Bromide of potash is a most important chemical in the developer, being used to prevent impure or fogged whites. If only enough bromide is used to insure pure whites, the print will be cold in tone. Increasing the amount of bromide in the developer will increase the amount of olive in the print. Thus, it will be seen that bromide is used for two purposes, namely, insuring clear whites and controlling tone.

1036. **Exposure and Development.**—Varying the exposure and development will vary the tone of the resulting print. For instance, an under-exposed print, forced in development, will be cold or blue in tone when compared to a fully timed print that develops to the desired depth

freely, even though the same developer is used for both prints.

1037. **Safe Light for Handling Paper.**—The slower brands of Artura paper may be handled in yellow artificial light without danger of fogging. Development may be carried on at a distance of six feet from a 16 candle-power incandescent electric light, or other yellow artificial light of about the same strength, without danger of fogging. The dry paper, of course, should not be exposed to the direct rays of such a light for too long a time. Be sure that the light in the printing room is safe. A test may be made as follows: Allow a piece of paper to lay exposed for the length of time necessary to handle it during manipulation. This piece of paper may then be developed and if the whites show fog, the light in the printing room is not safe. If the whites remain pure, the light is safe. Carbon Black, the fastest brand of Artura paper, must be handled in red or orange light, it being extremely sensitive.

1038. **Stock Hardener.**—The hardener used in the fixing bath may be mixed in large quantities, as it keeps indefinitely. A new fixing bath may be mixed at any time by simply dissolving the hypo in water, adding the proper amount of hardener.

1039. **Practice Work.**—Your previous experience with other gaslight papers will, of course, assist you wonderfully in the manipulation of Artura, for you will more readily understand the manipulation and can work more intelligently than if you had no previous instruction. For your first experiments better results will be obtained if the instruction given herein is followed to the letter. As there are different grades and surfaces of Artura paper, for your practice work take them up in their regular order and observe each step of procedure. With "Artura" particularly, you should observe all failures and note all data pertaining to their production on the back of the print. If you meet with failures in any department, consult the General Information department following the lesson, where you will most likely find a remedy, and after a few experiments,

you will be able to produce really beautiful results. Prints from all your first efforts with each grade of paper should be preserved, as your first work will be a guide to advancement. Carefully note all data pertaining to manipulations from beginning to end. Note these on the back of each print, preserving them in your proof file. They will prove to be a splendid reference and assistance for future guidance.

1909 SUPPLEMENT

1039*a*. **M-Q Developer and Its Composition.**—The chemicals used in the Metol-Hydroquinon developer should be dissolved in the order given in the formula.

Metol and Hydroquinon are the developing agents.

Sulphite of Soda is used as a preservative and prevents the developer from decomposing rapidly and becoming discolored.

Carbonate of Soda is used to open the pores of the emulsion and allow the developer to act freely and evenly.

Bromide of Potash is used to keep the whites clear, and is also important in controlling tone. The more Bromide used the more olive will be the tone of the resulting print. Without Bromide, or with too little Bromide, grayish, fogged prints will be obtained. Be sure to use a Saturated Solution of Bromide in the developer.

1039*b*. **Modifying Developer to Control Contrast.**—Developer mixed according to formula cannot be improved on for the general run of work.

Increasing the amount of hydroquinon and reducing the amount of metol will increase the brilliancy or contrast of the prints to a certain extent.

Increasing the amount of carbonate will cause developer to work more vigorously, and also tend to produce black tones without olive. Reducing the amount of carbonate will cause developer to work slower and will produce softer results.

It will thus be seen that **to produce more contrast** in prints the hydroquinon should be increased, also the carbonate, and as this will tend to make developer work more rapidly, the bromide should be increased so as to enable the operator to control the development of the print.

To produce less contrast in prints use double the amount of metol, half the amount of hydroquinon and half the amount of carbonate called for in the regular formula.

If developer discolors rapidly when being used, it will indicate weak or old sulphite of soda, which is the preservative. Use fresh sulphite of good quality.

Bromide of potash plays an important part in the developer. We cannot give the exact amount necessary to use under all conditions. Some of the conditions that make it necessary to vary the amount of bromide are as follows:

Water used in mixing developer.

Quality of soda used.

Age of paper, etc.

Old paper will generally require more bromide than fresh.

Enough bromide should be used to keep the prints from fog-

ging in the developer. If only enough to do this is used, the tone of the prints will be cold or blue-black.

A slight increase will give a better black.

With further increase comes the more desirable warm or olive-black tone.

The formula which follows is based on the preceding principles. It will produce good prints from negatives that are inclined to be strong, and also from normal negatives for low tone effects where contrast or snap is not desirable.

It will give good, rich prints, but will search up into the highest lights for every gradation or half-tone. This developer works slower than the normal developer, on account of the reduced amount of accelerator (carbonate of soda), and to avoid flatness prints should be allowed more time to develop. Following is the formula:

Water	40 grs.
Metol	20 grs.
Sulphite of Soda (dry)	1 oz.
Hydroquinon	40 grs.
Carbonate of Soda (dry)	90 grs.

When ready to develop add one drop of a saturated solution of bromide to each two ounces of developer.

In hot weather you may find it advisable to reduce the amount of carbonate in your regular developer, even though you don't want a soft print. Too much carbonate in the developer during the summer months may make your prints too contrasty, as the developer is apt to work very vigorously and quickly unless the temperature is kept down to normal; 65° to 70° Fahr. is normal.

1039*c*. **Controlling Tone and General Quality by Exposure and Development.**—All Artura papers possess considerable latitude of exposure. By that we mean the exposures may vary some without changing the tone or general quality of the prints.

Following are effects produced by different exposures, using the same developer throughout:

Extreme Under-exposure and forced development will cause prints to be flat and weak, cold or blue in tone, and lacking detail in the high-lights.

The whites in a forced print are also apt to be grayish or discolored and stained.

Slight Under-exposure will produce prints of fairly good quality, but cold in tone.

Normal Exposure will of course produce the best effects. Normally exposed prints will develop to the desired depth freely without forcing the development.

Slight Over-exposure will increase the contrast of the print slightly. This rule can be used to advantage on negatives that lack snap or brilliance. For this reason slight over-exposure should be avoided when printing from harsh negatives.

Extreme Over-exposure will cause prints to develop rapidly and to be flat and muddy in general appearance.

1039*d*. **Temperature of Solutions.**—Hot weather will not cause Artura prints to blister, frill, stain or to become soft and sticky.

The proper temperature for all solutions is 65° Fahr., and if convenient they should be kept at about that temperature.

CHAPTER XXXVIII.

Post Cards—Printing-Out Paper.

1040. **Introduction.**—When photo post cards were first introduced they were used almost entirely for landscape, architectural, views of historical points of interest, etc., but little or no use was made of them for portraiture. The fad grew to such proportions and so rapidly it was generally conceded that it would last for but a short time. However, instead of the demand diminishing, it has grown in favor to such an extent that many professional photographers are compelled to make portraits on post cards; in fact some photographers are conducting exclusive postal photo studios.

1041. The first post cards made were sensitized by the user with solutions personally prepared. Finally solutions for sensitizing all surfaces whether post cards, heavy card-board, cloth, silk or linen were put up—ready for use—by manufacturers and may be purchased from any photo supply house.

1042. These sensitizing solutions can be applied to any surface you may desire to print on. The sensitizing, printing, toning and fixing are exactly the same as the manipulation of any printing-out paper. As the novelty and process of sensitizing materials yourself is very interesting we therefore give you the formula and methods of procedure. There may be times when there is a desire to print on special surfaces. By following instructions you will be able to prepare the material and make very satisfactory prints thereon. While these instructions apply directly to post cards, as stated above, the same methods will apply to any surface you may wish to sensitize.

1043. **Sensitizing Post Cards.**—For this purpose obtain a plain post card, unstamped, at any stationary store, or the officially stamped card at the post office. The next step is to prepare the cards for sensitizing. Before doing this, first apply a salting solution to the card.

1044. **Salting Solution.**—

Water.....4 ozs.
Salt (Common Table Salt).....24 grs.

The water must be free from iron rust, as every particle of such rust will leave a black spot on the card.

1045. After the salt is fully dissolved, pour the solution into a clean 5 x 7 tray. Place the cards, one at a time, in the solution, immersing entirely and allowing them to remain about one half minute. Next pick up the cards, by a corner one at a time, and dry before a fire as rapidly as possible. Carefully avoid getting the fingers on the side of the card being sensitized.

1046. A large number of cards may be salted at one time and, when dry, stored for further use. When cards have been salted and dried, the next step is to sensitize them. Sensitize however, only as many as are wanted at the time. The sensitizing solution is prepared as follows:

1047. **Sensitizing Solution.**—

Nitrate of Silver.....150 grs.
Water (Clear or Distilled).....4 ozs.
Citric Acid.....3 grs.

Place in a bottle and label "*Sensitizing Solution.*"

1048. **Sensitizing The Card.**—Place the salted card face up on the tips of five fingers of the left hand. Next pour a quantity of the sensitizing solution on the corner of the card and flow over the entire surface, being careful that none of the solution runs over onto the back of the card, then drain balance of the solution back into the bottle.

1049. If only part of the card is to be sensitized spread

the sensitizing solution over that part only, by dipping a piece of absorbent cotton into the sensitizing solution. Dry the card as rapidly as possible in a dark room or one lighted by a ruby lamp.

1050. **Printing.**—Unlike the developing cards the image is visible during the printing and should be printed in good strong daylight. Print a trifle darker than desired when finished, as the toning and fixing will cause the image to grow somewhat lighter.

1051. **Toning.**—Prepare the toning bath as follows:

STOCK SOLUTION NO. 1.

Chloride of Gold	15 grs.
Pure Water	15 ozs.

Place the chloride of gold in a large bottle, adding 15 ounces of pure water. Shake well until all the gold is dissolved. Label this bottle "Gold Stock Solution No. 1."

1052.

STOCK SOLUTION NO. 2.

Acetate of Soda	1 oz.
Add Water to make	10 ozs.

This makes a 10% solution. Dissolve the chemical thoroughly and label the bottle "Acetate Stock Solution No. 2."

1053.

STOCK SOLUTION NO. 3.

Borax Crystals	2 ozs.
Hot Water	4 ozs.

As borax crystals do not dissolve freely, the use of hot water is advised. Label this bottle "Borax Solution No. 3."

1054. Prepare your toning bath as follows: Into a 2-qt. bottle pour 48 ounces of water; of Stock Solution No. 1, add 1 ounce; Stock Solution No. 2, 1 ounce. Shake thoroughly the bottle containing these solutions and allow it to stand and ripen. When ready for use, pour this bath into

the toning tray, placing a piece of red litmus paper in the bath; then add gradually a little of Solution No. 3, sufficient to turn the red litmus paper blue in two minutes. If the small quantity of Solution No. 3 you have added does not perform this work in the given time, then add more of the solution, and continue to add until the litmus paper does turn blue. The best litmus paper to use for testing the gold bath is that put up in small glass vials. A small bottle will last a long while. We advise the procuring of a bottle of blue as well as one of red, for should your bath become acid by continuous use, it can be tested with blue litmus paper.

1055. Allow the bath to ripen at least 24 hours. If bath has not been allowed to ripen, prints are likely to bleach. Most poor results are due to the fact that the toning bath is too fresh. Wash the prints in ten changes of clean water. This should take 20 minutes. The cards should be picked over and over between each change of water. Place the cards, one at a time, face up, in the toning bath, picking them over and over. The number of cards placed in this bath at one time should not be more than 15. For the beginner we would advise the toning of only three or four cards at first. This will enable him to study the process of toning more closely. When the desired tone has been obtained, remove from the toning bath and place in a tray of clear water. When all cards have been toned place them in the fixing bath, previously prepared as follows:

Water	2 qts.
Hyposulphite of Soda	4 ozs.

1056. After fixing, wash thoroughly one hour in running water, picking the prints over and over by hand, for one-half hour. Also pick the prints over and over between each wash. While prints are in the hypo bath they should be picked over and over to insure thorough fixing.

1057. **Sepia or Vandyke Brown Tones.**—Without previously washing the prints place them one at a time in the

following plain hypo fixing bath and allow to remain for at least 15 minutes:

Hypo.....1 oz.
Water.....20 ozs.

The longer the cards are allowed to remain in the hypo, the deeper the tone. After fixing, wash in the usual manner. They are then ready for drying.

1058. **Ready Sensitized Self-Toning Post Cards.**—Post card stock, as you have learned in previous instruction is furnished already sensitized by most manufacturers of printing-out paper. While these cards are printed and toned exactly as any printing-out paper, it will be well to digest the following simple instruction.

1059. **Printing.**—Print until all detail is out, or about two shades deeper than the finished print.

1060. **Washing.**—Wash in six changes of water, separating the cards thoroughly in each change of water.

1061. **Fixing.**—Hypo bath—4 ounces of hypo crystals to 32 ounces of water, or 30 grains hydrometer test. Fix for 20 minutes.

1062. **Washing.**—Wash one hour in running water, or 16 changes by hand, separating the cards thoroughly in each water. Dry in the usual manner. You will note there is no toning bath used. The toning takes place in the wash water and in fixing, the tone produced being a carbon sepia. Rich purple tones may be produced by following instructions for gold paper. (See Vol. I, Chapter XVIII.)

CHAPTER XXXIX.

Post Cards—Gaslight Paper.

1063. **Grade of Post Cards.**—The different brands of sensitized post cards on the market are numerous. The most popular seem to be "Velox," "Azo," "Cyko," and "Argo." All are good, working very much alike and it rests entirely with the user as to which brand to employ to obtain the best results. We would advise the use of reliable products. Learn to use them so as to get the best effects and when thoroughly familiar with a certain product stick to it.

1064. All manufacturers supply post cards in a variety of grades and surfaces. Each brand has a special name, letter or number. They are all known, however, as "hard" or "soft," in the surface desired. The hard is to be used for thin negatives lacking contrast. The surface is supplied in either smooth, matte or semi-matte. The smoothness, however, varies according to its manufacture. The soft grade should be used on negatives having the desired contrast. These are more sensitive than the hard, and, therefore, print faster. The glossy surface is extremely glossy and is suitable for glazing. As most postal negatives are developed thin for quick printing, the hard grade is almost universally used.

1065. **Developing Outfit.—**

1 8 x 10 tray for Developing.
1 8 x 10 tray for Acid Clearing Bath.
1 16 x 20 tray for Hypo.
1 16 x 20 (or larger) Washing Tray.

1066. These trays should be used only for the one purpose for which they are intended: Developer for developer only; Hypo for hypo only; Acid Clearing Bath for acid clearing only; Water tray for washing only. A good plan is to either letter or number each tray to avoid danger of mistakes occurring.

1067. **Printing Light and Printing.**—While perfectly practical to print post cards by the use of daylight, it is preferable to use artificial light. Artificial light is steady and more even than daylight. Daylight at 12 o'clock noon is of course much stronger than at 4 o'clock in the afternoon, and, therefore, makes a great difference in the length of an exposure. Artificial light remains practically of the same strength at all times. To print post cards the exposure is practically the same as on any gaslight or developing paper. When post cards are made in large quantities, an electric light similar to Illustration No. 7 should be employed.

1068. **Vignetting.**—Post cards may be vignetted exactly the same as other gaslight papers. (See Chapter XLI, Vignetting.)

1069. **Printing With White Margin.**—In order to print a white border, whether oval or square, will require cut-outs, or masks made of black or opaque paper. Any desired opening may be made and the mask placed on the film side of the negative between the paper and film. (See Chapter XL, Dodging in the Printing, for cutting masks.)

1070. All post cards or prints on heavy paper should be printed with a very small white border. This gives a finished appearance. Borders are best applied to dark backgrounds, and vignettes are most pleasing when made on white grounds.

1071. **Developing.**—While any developer intended for gaslight papers may be employed, yet, owing to the fact that the emulsion of each brand of paper is different, they require a developer properly balanced to suit the emulsion, and where one formula is used for all papers, the proportions of the different ingredients will need to be altered to suit the paper employed; for example, some papers require more alkali than others; some work soft and, therefore, require less metol than papers that work hard and contrasty. As the emulsion used in sensitizing post cards is somewhat the same as used for coating the regular stock, a developer suitable for the regular stock of any brand will also answer for developing post cards. Very fine results are obtained by using the prepared metol-hydroquinon or ortol-hydroquinon solutions supplied by the different paper manufacturers. Both of these solutions work well and are always ready for use. With different degrees of dilution splendid results can be obtained on any of the different products.

1072. **Fixing.**—The acid fixing bath should be used the same as for all gaslight papers. As hypo is inexpensive this solution should be made up in large bulks, and fresh baths prepared frequently.

1073. **Substitution of Ortol for Metol in the Developer.**—The metol-hydroquinon developer usually gives the best results; however, ortol may be substituted for metol. Metol possesses somewhat of a poisonous nature to some, often causing an itching and a soreness of the skin. With ortol there is no danger of poisoning, and the same results can be produced. When ortol is used, use the same quantity as metol.

1074. **Washing.**—Wash the cards in the usual manner, handling them over occasionally to insure thorough washing.

Note.—See Vol. IX for **Making Post Cards for Quick Delivery.** Detailed instruction is given there for both exposing and developing the plates, as well as printing, developing, fixing and drying the post cards.

1075. **Drying.**—The greatest difficulty to overcome in drying photographic post cards is to prevent their curling. One of the best methods is to stretch cheesecloth tightly over a light wooden frame. Place your cards, face down, on this frame and allow to remain there until dry. Previous to laying them on this cheesecloth, carefully blot them and place the cards between two blotters to remove all surplus water from the prints.

1076. Another most practical method is to nail strips of wood about ¼ of an inch thick, on a board, placing the strips about four inches apart. Lay the cards, face up, between these strips with the ends resting against the strips. This will bend the card to almost a half circle. If allowed to remain in this position until dry they will readily flatten when stacked together.

CHAPTER XL.

Dodging in the Printing.

1077. There are few negatives that cannot be improved by a little dodging in the printing, and with a little care, most pleasing effects can be produced, which are not visible in the original negative.

1078. The average photographer who is generally successful in exposures is bound to meet with failures once in a while, and frequently his failures are on most important pictures. In professional studio work the operator, no matter how skilled, or how carefully he may work, is sure to occasionally meet with failures. Oftentimes the poorest printing quality negative he has produced is the best likeness of the subject, and if such negatives are ordered from, it is up to the retoucher and printer to make the best print possible from the negative in question. The retoucher can soften harsh lines, etc., but it is the duty of the printer to hold back the shadows and equalize the results from the negative.

1079. In considering altering, or dodging, in printing, the photographer has but one idea in mind; that is, to balance the negative so it will yield uniform prints. This may require the strengthening and building-up of portions that are weak, or the retarding of the parts that are too strong, or perhaps both. All this can be accomplished by a little care and time devoted to doctoring the negative.

1080. **The materials necessary** for this work are few and inexpensive. The following outfit should be in every printing room: 1 oz. powdered yellow ochre; a tube of Prussian blue; 1 ounce of glycerine, or in its place a paraf-

fine candle will answer; a bottle of ground-glass substitute; one E Faber blue pencil; a dozen sheets of fine tissue paper, or onion skin.

1081. With the above outfit one is supplied with all the paraphernalia necessary for the altering and dodging of a negative.

1082. Let us, for convenience, place the regular run of negatives into three classes:

1083. Class 1. A good uniform negative with excellent quality throughout; a negative which, if all the quality that is in the plate could be obtained in the print, would be most satisfactory. Such a negative is to be considered a model.

1084. Class 2. In this class will be considered weak, thin, flat negatives, full of detail, but lacking in snap and contrast.

1085. Class 3. In this class will be considered hard, contrasty negatives; plates with clear glass shadows. These are usually the most difficult from which to print.

1086. Included in this class we will consider negatives of subjects, or objects, possessing decided contrasts. For instance, a figured gown in white, with a black background; groups with some gowned in white, others in black; at-home portraits, where there are decided lights and shadows. Usually negatives of this character, unless very carefully made, are liable to prove too contrasty, and require some dodging in the printing, to produce even results.

1087. Considering the various classes of negatives in the regular order, we will begin with *Class* 1, the ideal negative. An ideal negative may possess varying degrees of strength. The negative itself may appear anything but beautiful. It may have a gray-brown tone, or even a yellow, and yet be a negative with ideal printing quality.

1088. By an ideal negative is meant, not absolutely a negative beautiful to look at, but one that has the *meat*, the solidity—in a word, the quality for producing good, vigorous prints, without dodging in the printing.

1089. By the foregoing statement we do not mean

that such a negative can be carelessly placed in bright sunlight and produce perfect prints. By no means. But by printing in the proper strength of light such negatives can be made to yield perfect prints. Therefore, it depends entirely upon the judgment of the printer as to the quality of the negative being printed from, for final results.

1090. For example, an ideal negative may have a gray-brown color, yet be soft, snappy and crisp. Such a negative must be printed slowly in the shade, so as to print deep into the emulsion and obtain all the *meat* there is in the negative.

1091. The slow class of negative, (strong, developed heavy,) can be printed in a light of greater strength for the reason that the strength of the negative will require longer exposure, thus printing deeper into the emulsion.

1092. Now let us consider a very thin, snappy negative, of an ugly yellow color, the shadows apparently thin, the highlights snappy but not hard—on the whole, a very displeasing negative to look at, yet a wonderful printer. Why? Because the ugly yellow color gives strength to the shadows, retards the printing of the entire plate evenly, thus permitting the light to penetrate deeply into the emulsion, retaining all the value there is in the negative. Such a negative, being thin, must be printed in medium strength light, while the same class of negative developed stronger should be printed in bright sunlight. In fact, if a yellow colored negative was exceedingly strong it would be difficult to produce satisfactory prints from it, but owing to the fact of its being extremely thin, the yellow is its salvation.

1093. Grading the light for different negatives may be done in many ways. If printing in a regular printing window, it should contain ground-glass. Or, if plain glass is used, the sash should be covered with tracing cloth, either tacked onto the window or attached to spring rollers, so that when the weather is dull the curtains may be rolled up, or removed from the sash, and the printing continued in dull light. When the sun is shining brightly the tracing

cloth curtains can be drawn down, slightly diffusing the light. Where plain glass is used in the printing window it is unsafe to print even strong negatives without some diffusion, as streaks or imperfections in the glass will surely register upon the print.

1094. When printing from thin negatives, which apparently print too fast, cover the entire frame with fine tissue paper or onion skin. If you want to retain all there is in an ideal negative, never print in open sunlight, but always diffuse with ground-glass or tracing cloth. Never have the printing frame nearer than 12 inches from the ground-glass or tracing cloth. The greater the distance, the more diffusion and slowness of printing.

1095. While printing in large studios is sometimes carried on in open sunlight and out in the open air, it is dangerous, as the atmosphere affects the paper and will not yield as good results as where the temperature is more even. When the negative, the printing frame and the paper are all the same temperature, there is nothing to interfere with the printing.

1096. *Class* 2. In considering this class of negatives, which are weak, thin, flat, full of detail, but lacking in snap and contrast; the altering or dodging of such a negative, means of course, to supply the negative with that which it lacks in order to produce a good print. The principal point of weakness in such a negative is lack of snap and contrast, so proceed to doctor the negative and to correct these errors. By slow printing will be obtained more strength, so immediately cover the printing frame with one or two thicknesses of onion skin, according to the quality of the negative. After covering the printing frame with the tissue, place the negative in the frame, holding it up to the light to look through it. Note the parts of the negative which need strengthening; apply to these parts on the tissue paper, a little dry yellow ochre, rubbing it over the surface of the tissue with the end of the finger. The heavier you apply the ochre the greater will be the restraining. If only slight strengthening is required, apply lightly.

Dry ochre should be used on all parts which require strengthening, or holding back, during printing.

1097. After the large patches or parts of the negative have been cared for on the tissue paper, next flow the glass side of the negative with ground-glass substitute, which will set and dry very quickly. When dry hold the negative before the light, and with a Faber pencil, trace over the ground-glass, building up the highlights. The pencil is especially convenient for portrait negatives, in holding back minor shadows in the hair, softening the shadows around the eye, forehead, and strengthening the lines in the drapery. These lines on the ground-glass must be made very lightly, because being so near the film, if made too strong, they would print sharp instead of soft and blending.

1098. With a little care one can alter any negative, balancing it so that it will produce uniform prints.

1099. *Class* 3. In this class of negatives, containing heavy contrasts, the negative should be treated the same as for Class 2, as far as tissuing the frame and flowing the negative with ground-glass substitute is concerned. When doctoring the shadows, however, spread the ochre evenly over the entire thin portion of the negative, gradually blending according to the density of each portion of the shadows. After doctoring for the shadows on the tissue, apply similar treatment to the ground-glass, but in a milder form. This treatment should restrain the shadows sufficiently.

1100. Now for the highlights. With a tuft of cotton dipped in alcohol, remove the ground-glass substitute from the highlight portions of the negative entirely. If this does not give even prints, and the highlights still print too strong, rub a little glycerine over the tissue covering this portion of the negative. The glycerine will make the paper transparent and admit the full rays of light upon these portions.

1101. There are cases where only parts of a negative are weak, as in portraiture, where the hands or the face are

a trifle too dark, the remainder of the negative being of good printing quality. In such a case do not ground-glass the negative at all, but on the glass side, apply a little Prussian blue to the parts to be restrained. Squeeze from the tube a drop or two of this color upon a clean glass, and with the tip of one finger spread it on the glass, blending it down to a mild tone; then with the same finger apply it to the portions of the negative that you wish to hold back. This of course you will do on the glass side. The grain of the flesh in the finger acts as a sort of stipple, giving a soft blend, while the blue color, being somewhat transparent, will not restrain as much as yellow. Consequently, the blue may be applied directly to the glass side of the negative with good results. In fact the majority of negatives made by professional photographers are "blued" in certain parts, to equalize the printing.

1102. While the ground-glass substitute referred to in this instruction can be purchased from any photographic supply dealer, you can prepare it yourself according to the following formula:

1103. **Formula for Ground-glass Substitute.—**

Sandarac	¼ oz.
Mastic	24 grs.
Sulphuric Ether	2½ ozs.
Rectified Benzol	from 1¼ to 1½ ozs.

1104. All the necessary chemicals may be purchased at any drug store.

1105. Dissolve the sandarac and mastic in the ether (filter if necessary) and then add the benzol. The less benzol used the coarser the grain. Benzol must be kept in a tightly corked bottle.

1106. **Caution.**—Never use this varnish near a naked flame, as it is highly inflammable. Be sure to get benzol and not petroleum benzine.

1107. The ground-glass substitute on the negative gives more strength to the shadows, but at the same time it reduces the printing quality in the white draperies and

highlights. If it is desired to print any of these parts stronger, take a piece of cotton cloth dipped in alcohol and proceed to wash off the varnish, or substitute, directly covering the white parts. You will also find that with a sharp knife you can scrape the substitute or varnish, and it is really a cleaner method than using the alcohol. When you have done this, place the negative in the printing frame and cover the frame with two thicknesses of tissue paper, being careful to use French tissue, or onion skin. Ordinary tissue paper has minute holes which would cause black spots on the prints.

1108. Now make a proof, and if you find it does not give the desired results, add one or two more thicknesses of tissue paper and you will be pleasantly surprised to see how much more strength and vigor is imparted to the negative.

1109. If there are only small portions of a negative that you wish to keep back in printing, it is a good plan to apply the substitute on the glass side to these parts which you want to hold back in printing. If it is necessary to hold back the shadows, or strengthen the highlights apply, with a stump or duster, a little blue, yellow or black dry color. The highlights may also be strengthened, by working on this ground-glass substitute with powdered black lead or blue pencil. The blue pencil should be used only where a slight increasing of the highlights is desired. Now, if you desire to increase the strength of the shadows, work over them by rubbing a little vaseline, or gum water, into the ground-glass varnish. This will make the matte appearance more transparent and the shadows will print deeper. The same can be done with the highlights, if they appear too strong.

1110. Still another method of making the highlights print softer, or the shadows deeper, is to melt a little paraffine and apply it with a small camel's-hair brush directly to the tissue paper on the places that you wish to print more deeply. The paraffine will make the tissue paper (where applied) absolutely transparent, allowing the draperies to

print in harmony with the rest of the print. If convinced that the paraffine has been applied too thickly, scrape it down with a sharp knife.

1111. Paraffine is better than vaseline or oil for this purpose, as they will spread, while the paraffine will not. Remember that wherever doctoring is done it is necessary that the negative be printed under tissue paper.

1112. Often times you will find dirty finger marks on the gelatine side of the negative. These you can readily remove by rubbing with a piece of cotton batting which has been moistened with glycerine. After you have removed the spots, take another piece of cotton and rub perfectly dry the places where the glycerine has been applied. The glycerine acts like a varnish on the negative.

1113. Another very simple method of increasing the density of any portion of a negative is to mix a little dry yellow or orange with one-half ounce of gum senegal, applying thinly with a camel's-hair brush, moistened with saliva. You will find this will add enough density to the required parts of the negative, without affecting the detail.

1114. In printing landscape negatives you will find that applying a little of this coloring to the sky and portions of the clouds will increase their strength and improve them very much. In printing a group, if part of the faces print too dark, a little rubbing in of light blue or yellow paint on the tissue, directly over these faces, will improve them. For faces that print too white, the tissue paper directly above them should be treated with melted paraffine, which will make the tissue transparent, causing this part of the negative to print faster.

1115. **To whiten the sky in landscapes,** hold the negatives over a piece of lighted camphor, glass side down. The smoke from the camphor will cause a gathering of soot. Where this soot adheres to the parts of the negative that you desire to print fully—such as trees and buildings—it can be readily removed with a soft cloth or brush. Great care is necessary in handling a negative of this kind, however, as the blackening will rub off quite easily. An ex-

cellent plan is to place the negative immediately on a piece of clean, plain glass, binding them together, to protect the blackening.

1116. By the exercise of a little ingenuity the printer can produce many pleasing and artistic effects, oftentimes making good prints from negatives that would otherwise be worthless.

1117. **Plain Prints.**—All negatives from which plain prints are to be made should be printed either in the shade, or under tissue or ground-glass, and not in direct sunlight, as printing in the sun produces a surface print, with no depth of brilliancy when finished. Weak negatives can be very much improved by printing in the shade under green tissue paper. If in the sun, put a white tissue paper over the green.

1118. **Fresh Paper.**—When paper prints brown or purple, with muddiness in the half-tones, it is quite fresh, and should be kept in a warm place (near a radiator) for a few days. Paper treated in this way will soon print a rich red color. Fresh paper must be printed darker than older paper, which prints a cherry red. When, during cold weather, paper gives prints with weak purple in the shadows, it is on account of chilling, the chemical action failing to take place freely. Always print in a warm temperature if you wish the best results. In the winter, paper thirty days old is much better than if very fresh. Older paper gives stronger, richer prints.

1119. **Holding Back Shadows.**—A simple method of holding back shadows on a face, or to lighten hair, drapery, etc., is to use a color (blue, or yellow) in solution. Apply with a small brush, in a net-work fashion, on the tissue over the parts to be lightened. This forms a filter screen.

1120. **Printing Dense Portions of Negatives.**—Detail in highlights and dense portions of drapery can be brought out by using a hand magnifying glass. Focus the light through the glass on the highlights, or the parts to be printed up, and by moving the glass the detail can be printed out in a few minutes.

1121. **Thin Negatives.**—Stronger prints can be obtained from thin negatives by flowing the back of negative with a ground-glass varnish, colored green.

1122. **Printing in Highlights.**—Detail in white draperies and highlights can be printed in by applying, with a brush, a little common retouching fluid on the tissue (covering the frame) over the dense parts of the negative. Retouching fluid will not spread like oil, nor turn yellow as quickly as turpentine.

1123. **"Home Made" Opaque.**—No. 1. Add enough water to yellow dextrine to make it about the constituency of mucilage.

No. 2. Mix enough water with Indian Red (dry color) to make it about the thickness of paint.

1124. To make the opaque, add one ounce of No. 1 to four ounces of No. 2. This is good for spotting negatives or blocking-out vignettes.

1125. The solution "Dextrine" can also be used as a mucilage in sticking down tissues. It will not sour.

CHAPTER XLI.

Vignetting.

1126. Vignetting is a term applied to the method of printing, by which the margins of the picture are made to gradually fade or blend away. This softness is produced in various ways. The vignette is usually made of cardboard, with a hole cut the size and shape to suit the requirements of the picture. The edge of the opening is cut all around with teeth or slits, and covered with a sheet of thin tissue paper, to lend softness to the vignetting. This is placed over the negative during the printing operation.

1127. An important point is the distance between the negative and vignetting card. Usually this should be at least one-half inch. The greater the distance, however, the smaller should be the opening.

1128. While there are a number of methods employed and a variety of ready made vignetters that can be purchased from any photographic stock house, yet it is absolutely impossible to employ the same vignetter for all purposes. Therefore, it is more practical to make your own, fashioning them to suit the particular negative it is desired to vignette. The ready made devices are intended principally for portrait work, and have oval or other shaped openings. Some are made of glass; others of zinc having openings with serrated edges; and still others like the Dixie vignetter, the opening of which can be adjusted to negatives of any size or shape. (See Illustration No. 10.)

1129. All of these are intended for cabinet portrait work. Perhaps the most practical ready-made vignetter is

the Dixie. It consists of a thin board which fits over the entire printing frame, having a large opening fitted with cardboard wings, operating on a pivot similar to the diaphragms of a shutter, except that they may be adjusted to openings of any shape desired, by simply moving the wings. With this any part of a negative may be vignetted, as it can be adjusted up and down, sideways or oblique.

1130. Suitable vignetters may be made at practically no expense, other than a little time, and be in every way serviceable, in fact this method is used in all large studios. Quite a number of vignetters are composed of different shaped openings for various sized negatives, insuring some one opening out of the lot to fit the negative you wish to vignette. If a negative requires an odd shape vignette it will take but a few moments to make one especially suited for that particular negative.

1131. **Tools Necessary.**—Small tack hammer, pocket knife or scissors, small bristle paint brush, also an ordinary paste brush.

1132. **Materials.**—Covers of dry plate boxes, tissue paper or onion skin, tacks, opaque and paste. It is not advisable to use the ordinary starch paste for pasting tissues, as it sours quickly and soon becomes spoiled. Gum arabic is the best paste to use. One-half ounce of gum arabic dissolved in from 6 to 8 ounces of water makes a good paste, which will keep for a long time.

1133. With the tools and materials mentioned proceed to make your vignette in the following manner; if you wish to vignette a 5 x 7 negative, use a 5 x 7 dry plate box cover. Cut a hole in the cover, the size and shape to suit the requirements of the negative. For a bust portrait the opening may be oval or pear shape. The opening should be a trifle smaller than the portion of the negative to be printed, allowing for the tissue and serrated edges to do the main work of grading or blending. (See Fig. 1 of illustration No. 11.)

1134. Next, notch the sides of the four corners, about one-half inch, and score the side by making a light cut

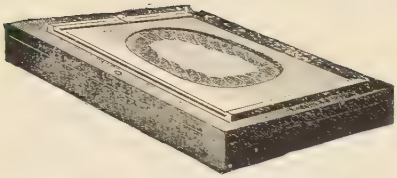


Illustration No. 10
Dixie Vignetter
See Paragraph No. 1128

Illustration No. 11
Vignette for Printing-Out Papers
See Paragraph No. 1133

LIGHT BEYOND

STUDY NO. 18

BY W. E. BERTLING

from corner to corner, all the way around; so that these ends and sides can be bent outward, forming a flap, which can be tacked to the printing frame.

1135. With a pair of shears, cut small notches all around the opening, in the form of teeth (See Fig. No. 2); then apply a little paste along the edge of the opening, covering with a piece of French tissue paper, or onion skin. When dry, the vignetting device is ready to be attached to the printing frame.

1136. Place the negative in the frame, holding the frame containing the negative in your left hand, towards the light, at an angle so that it can be seen through. With the right hand place the vignetter in position. When properly adjusted so that it will vignette (cut off) the parts to be eliminated, remove the negative from the frame, firmly holding the vignetting device in position. Then turn the frame over, with the vignetting device on top. Lay on the table, being careful that you do not change the position of the vignetter while turning over the frame. Place a small tack at each corner; tap each tack lightly with a tack hammer—just enough to fasten the vignetter. Next turn the frame over and again place the negative in the printing frame, noting whether the vignetter properly registers with the negative. If it does and has not been moved during the adjusting, again remove the negative, while placing a tack on each corner to firmly hold the vignetter in place. The vignetter will then be securely fastened.

1137. Next, cover the opening of the vignetter with tissue paper, and place the negative in the printing frame. Hold the negative to the light so it can be seen through, carefully observing the effect produced by the vignette. If the opening appears too large, permitting too much spread of light at the sides or over the head, again remove the negative, and around the edge of the opening apply opaque to the tissue with a small paint brush.

1138. Good opaque can be prepared as follows: 1 ounce chrome yellow, 1 ounce vermillion, and 1 ounce gum arabic. Mix the yellow in 2 ounces of water; then add

gum arabic, which must be previously dissolved in a little water; and last, mix the vermillion with 2 ounces of water and add to the former. This makes an excellent inexpensive opaque.

1139. When applying the opaque to the tissue paper, draw the brush sideways along the opening, spreading the opaque more lightly in approaching the parts you want to blend to. This will give a gradual blend from the picture. See Fig. No. 3.

1140. Where you wish to vignette more closely (sharper) at the bottom than at the top, it can be done by making the vignette bevel shaped, in the following manner: Cut the corners of the sides of the box, a and b; then draw a line from these corners to the outer edge of corners c and d. With a pen-knife lightly score this line, sufficient to bend back, forming the flap which is attached to the printing frame (See Fig. No. 4).

1141. Another simple method is to build up your printing frame with wooden strips about ¾ of an inch, covering the frame with cardboard, with the opening made the same as previously described. Between the negative and the vignetter place absorbent cotton loosely around the opening. If the cotton is not packed too solidly and is quite fluffy, the light will filter through the edges, giving an excellent vignette.

1142. **Testing the Vignette.**—Place a piece of proof paper on the negative, clamp the back in position, and place in the window to print, slanting the frame at an angle with the sun. Print to the depth you would have the finished picture. Then remove from the printing frame and note the effects of the vignette. Should the vignette spread too far there will be need to paint the tissue closer to the opening.

1143. If the negative is a bust portrait and too much of the waist shows, place a loosely tufted piece of cotton (preferably absorbent cotton) at the bottom of the opening, between the negative and vignetting device. This cotton spread loosely will not only prevent the light from

spreading, but will act as a filter and give a gradual blend. If, on the other hand, the vignette is too close, either arrange the cotton farther away or remove the painted tissue paper over the opening, replacing it with plain tissue, using the cotton for adjusting the size of the opening.

1144. An important consideration is the distance between the negative and the opening in the vignetter. Usually this should be at least one-half inch. The greater the distance, however, the smaller should be the opening, because the greater the distance the more the light will spread. With a little practice you will be able to produce almost any effect desired.

1145. With a variety of these box vignetters cut to different shaped openings, you can, in a few minutes, attach the device and produce a correct vignette that will necessitate no alteration. In fact, many minor miscalculations may be corrected by a simple variation in the angle at which the frame is presented to the light.

1146. While the methods described are intended for printing in bright sunlight, the printing can be done in the shade, or when the sky is overcast, or cloudy. In order, however, to gain speed in the printing on cloudy days, it would be best to remove the tissue paper, or onion skin. The notched teeth in the cut-out will filter the weak light, and you will find there will be sufficient diffusion or blending of the vignette. Where the tissue paper is removed, however, it is advisable to use the absorbent cotton loosely arranged around the opening, thus insuring against sharp lines.

CHAPTER XLII.

Combination Printing.

1147. A landscape negative may in itself possess practically perfect qualities and give an excellent print. It may or it may not be artistic when considering balance, light and shade and general composition. No matter what strong points such a negative may possess, there is bound to be something lacking. A poor sky, in the majority of cases, is responsible for this defect. An absolutely white sky lacking in gradation of light and a horizon entirely lost, detracts entirely too much from the landscape proper, ruining to a great extent, a correctly composed subject. If the natural clouds appear in the sky, this error would be eliminated. Many times proper cloud effects will greatly improve a poorly arranged, or composed, landscape foreground. The amount of contrast between the light blue of the sky and the dark green of the foreground, is so great that when properly exposing the latter, the sky will be so tremendously over-exposed that it blackens up immediately. When the plate is inserted in the developer and becomes perfectly opaque, a print from such a negative will always give a blank, white, chalky sky. To remedy this error, it is advisable to employ some method of inserting clouds to match the foreground and landscape and, as such a method of procedure requires two negatives—a landscape negative and a cloud negative—the process is called double printing.

1148. The landscape negative may already have some cloud forms indicated in the sky, or the sky may be perfectly blank. By applying the methods herein described, which are extremely simple, requiring only a little practice

and patience, you will be able to improve many negatives, which otherwise might appear quite ordinary.

1149. A combination print to be successful must be entirely natural. There should be no indication of double printing. In order that the results may be true to nature certain conditions must be considered. First, there must be no false lighting; second, the picture should be harmonious as to definition. Suppose you have employed a selective focus to accentuate the foreground, so that the perspective distance will be out of focus, it would be entirely wrong to print in, next to the horizon, a perfectly sharp cloud negative. Third: There must be no sharp line betraying the junction or line where the print from the cloud negative meets the outline from the original negative. The two portions must be insensibly merged into one another to give a natural result.

1150. **Points That Must Be Observed.**—The junction line may include the horizon, the object projecting into the sky, such as a church steeple, roof of a house, or trees beyond a horizon. The landscape may have been taken late in the day. In this case probably the horizon will be light, and if so the clouds above it must be light. Therefore, if they are vignetted into the landscape the union will not show, for clouds should be printed lightly. If, however, the horizon is dark, you can vignette both light and dark clouds into it without the union showing. In this instance the clouds will generally be rather dark. In both cases you can vignette, but it would be very unlikely that you would have a light horizon with dark clouds in nature. Therefore, such a combination is uncalled for and need not be considered. If the objects are dark,—for example, the trees, the clouds are printed straight over them, for being only slightly printed they will not show in the slightest. But if the objects are light, for example, a church steeple, monuments, etc., and it is desired to print in dark clouds, it will be necessary to mask them, as we will describe later. These cases, however, are few and far between.

1151. **Masking the Negative.**—The simplest way to

mask a negative is to paste one thickness of tissue paper over the printing frame containing the negative. In order to hold the negatives in the frame while blocking on the tissue paper, provide two pieces of soft wood, one-half inch wide, and a trifle thicker than the inside of the printing frame. Place the negative in the frame; lay one strip on edge at each end, and around the top and bottom of the frame place a strong rubber band. This band around the frame and wooden strips will hold the negative from falling out of the frame, and gives you the use of both hands for masking or blocking out. Next place the frame before a window, with the tissue side facing you, resting the frame on the edge of the window sill or a small table, and looking through the tissue and negative you can clearly see the outline of the parts you want to block out. With a tuft of cotton dipped in dry yellow ochre rub on the tissue paper over the sky portion until you have blocked all parts you do not want printed. If towers or large trees project above the horizon line rub the ochre around them. It is not at all necessary to work in around small limbs or branches of the trees, as they will print quite light in any case.

1152. Having completely blocked out the sky on the tissue of the printing frame, remove the negative and place it in another frame, and tissue the second frame as the first. This done, proceed to block out the foreground, or those portions which you do not want to show in the second printing. Apply the ochre quite freely, so as to make this portion almost non-actinic. The tissue paper being placed about one-quarter inch from the negative, the lines will not be sharp and the masking will be nicely blended. With the masking completed again return the negative to the first printing frame, place a sheet of printing-out paper on the negative and make your print of the foreground. If printing-out paper is used, print as deep as required for the finished print, then remove it from the frame. The result up to this stage is an unfinished print, in which the sky is absolutely white. Next place your

cloud negative into frame No. 2, and place the print on the cloud negative, adjusting it so that the masking on the tissue paper registers perfectly; then carefully clamp on the back and put the frame out to printing. With a little care you will produce a perfect union. Print your clouds to the desired depth necessary to match the landscape. After a little practice it will soon become an easy matter to produce perfect results.

1153. **Making Cloud Negatives.**—For the best results the cloud negative should be made from the same point and at about the same time that the landscape negative was made. It is not always possible to do this, however, and a few different cloud negatives should be made at a time when the opportunity affords itself. It is always advisable to make cloud negatives on a larger plate than other negatives. In this way you are able to use different portions of a cloud negative, and by proper manipulation some superb effects may be obtained. Cloud negatives should not be developed as far as other negatives; in fact, they should be developed thin, but snappy, thus permitting quick printing. The exposure necessary for making cloud negatives is usually about one-sixth or one-tenth of that of ordinary landscapes.

1154. In using cloud negatives for printing-in, care must be exercised in the choice of proper clouds for the view in which it is intended to use them. If, for instance, a landscape having clouds is to be used, and it is lit more from the left, the printed-in clouds should not be lit from the right, or from any other direction. Nor should clouds, taken close, be printed-in near the horizon. Cloud forms should be selected with reference to their fitness to the rest of the picture.

1155. It is also wrong to print sharply focused clouds into a landscape taken on a gray day, with a hazy mist. In such a case invert the cloud negative and print from the glass side. In fact, quite frequently the picture is improved even where the landscape is focused sharply to have the clouds slightly out of focus. In order to have a true rep-

WOODLAND STREAM

STUDY NO. 19 — BY WM. T. KNOX

Illustration No. 12
Printing in Clouds in Landscapes
See Paragraph No. 1156

resentation of the scene the clouds must either appear to have been taken at the same time, or at least, should be in keeping with the general feeling expressed in the picture.

1156. By a little judicious manipulation cloud negatives lit from the left can be employed on landscapes lighted from the right, by simply inverting the negative. Where a larger printing frame than the size of the negative or landscape is employed, especially where the cloud negative is a size larger than the landscape, any portion of the clouds desired may be used to carry out the effect desired in the picture. It is safer to print clouds a trifle lighter than the landscape, for in doing so the masking is less likely to show and really better atmosphere can be produced. In illustration No. 12 we present a combination picture. Fig. No. 1 is a print of the foreground. Fig. No. 2 is a print of the cloud negative. Fig. No. 3 presents the scene with the clouds printed in.

1157. **Another Method of Blocking the Negative.**—By the following method not only is the negative blocked, but the blocking is also vignetted. First take a piece of printing-out paper the size of the negative and make a proof print from it. Next, take a piece of opaque paper the same size as the proof, place them together, and with a pair of shears, cut along the sky line of the proof, through the proof and the opaque paper at the same time. It is not necessary that you follow exactly every tree or piece of shrubbery, but if buildings are in the view follow the lines closely. For distant objects there is no need to be so particular. Save both masks. The sky portion of the proof you fasten to the negative with paper stickers attached to the edge of the print and negative. This mask will absolutely protect the sky from printing.

1158. In order to avoid a sharp line take the opaque paper mask, paste it to a card a trifle larger than the mask, with the cut-out edges overhanging the edge of the card. Place this card on the outside of the printing frame, overlapping the inner mask about one-quarter inch; then place the sensitized paper on the negative and print in the usual

way, printing until the foreground is fully printed. The mask on the outside of the negative will have the effect of breaking the line of the inner mask, thus giving a slight vignette to the inner mask, preventing a sharp line. After the foreground is printed, place the print in the printing frame containing the cloud negative, fastening the proof of the foreground mask over the negative. On the outside of the frame attach the opaque mask, arranged in a similar manner to the first vignette, and again place the negative out to print. The outside vignette will again assist in overcoming the sharp line which would be visible if the cut-out mask were used alone.

1159. **Blocking With Gamboge.**—Where printing is done on printing-out paper, with the image visible when printed, the use of gamboge for blocking out the image on the print for second printing may be employed.

1160. While gamboge can be applied to landscape work, it is more useful for portraiture, especially for reproductions in which it is desired to copy a picture, cutting out the old background and printing in one more suitable. This is done by double printing, though instead of using a paper mask for the first printing, an opaque or water color mask is employed directly upon the negative. The same opaque used for blocking out vignettes, formula for which has been previously given, is suitable for this purpose. For the second printing apply the opaque to the print. The best opaque for this purpose, however, is gamboge, as it will not stain the print as other opaques may.

1161. If you were to make an outdoor portrait with a brick wall for a background and it was desired to do away with the brick wall, it would simply be necessary to paint a line carefully around the figure, using opaque for the purpose. After this line has been drawn the color may be applied quickly to the remainder of the background. If the negative is large the greater part of the ground may be covered with opaque paper instead of paint. The paper mask can be pasted to the edges of the glass side of the negative, while the finer details of the outline are painted on

the film side. After the figure is blocked out place the negative on the sheet of printing paper and print to the desired depth. Then remove from the frame and with a thick solution of gamboge, proceed and paint over the surface of the print, covering only the figure or the printed portions. Exercise care that you do not work too closely to the edge, because to overlap would leave a line. Better not block far enough than too far, as if not blocked enough, those portions unblocked would only print darker, and, as usually a dark background negative is used for second printing, the margin will show but little. However, if you block over the outline a white line is left, which will have to be spotted out in the finished print.

1162. After the gamboge becomes dry, which will require but a few moments, place the print upon some selected landscape negative suitable to the picture, and print the background to the same depth you have printed the figure. The gamboge, if properly applied, will prevent the figure from printing, and when both portions are printed to exactly the same depth they should show no trace of the double printing. When the printing is completed, the coloring matter used to protect the figure is washed off, and you will then have a print of the portrait, to which has been added a suitable background. Washing, toning and subsequent operations are then carried on in the usual way.

1163. Should there be slight flaws or imperfections in the outlining of either the print or the negative, with a little touching out on the finished print, with spotting color, they can be removed.

1164. In selecting a background for figures be careful that the lighting of the combined negatives is from the same direction. For example, if the portrait was lighted from the right and the background surrounding it showed light coming from the left, a false result would be produced.

1165. **Printing-In Figures in Groups.**—When it is desirable to add an extra figure to a group, a small negative must be made of the additional figure, the size and posi-

tion to be in keeping with that of the group. If a copied picture is to be added in place of an original sitting, you must be guided entirely by the style of copy and the arrangement of the original group, providing space for the additional figure accordingly. With the single figure copied, block the negative. Next place the group negative in a printing frame, covering it with a sheet of sensitized paper. Hold the negative in the frame before the light, and with a lead pencil outline on the back of this paper the space to be occupied by the additional figure. Next provide yourself with a printing frame a size larger than the group negative. Place in this frame a heavy glass. On this glass place the single negative covering it with the sensitized paper, adjust the figure to the pencil outline on the sheet of paper and then carefully clamp the back on to the printing frame.

1166. The printing frame used should contain a back cover two-thirds of which can be opened so that the small end may be used over the small negative, thus permitting of examination of the print during printing. After the negative and paper are properly adjusted in the frame, mask all of the glass side with opaque paper, admitting only the figure. It is not necessary that the opening in the mask be fitted close to the figure. If the small negative is fully blocked and within half an inch of the figure it will be sufficient.

1167. You are now ready for printing the single figure. Print to the proper depth. When complete remove from the frame, and with a thick solution of gamboge carefully paint over the entire figure. The gamboge must be thick enough to block out all actinic light from the figure. After the gamboge is completely dry, place the group negative in a printing frame, laying the sheet of paper containing the single figure upon the negative, adjusting it to the proper position. This done, clamp the back on the frame and print the remaining group to the same depth that the single figure has been printed. After printing, the gamboge is washed off, the print being toned and finished in the usual way.

CHAPTER XLIII.

Double Printing.

Printing-in Borders and Tinting Margins.

1168. Artistic and effective results may be produced by double printing. This method is only applicable to printing-out papers, as the tinting is done in sections, and it is necessary to see what you are doing during the printing, in order to judge the depth to which each tint is being printed. Various tints may be produced, ranging from the lightest to the darkest. While extremely simple, the work requires careful and exact registering of the masks and paper when printing. To make a print with tinted border, from a small negative on a large piece of paper, it is necessary to be provided with several pieces of clean glass the size of the prints desired.

1169. In printing borders, the size of the print should always be about twice the size of the negative printed from. For cabinet size negatives usually 8 x 10 or 10 x 12 paper is used; for 7 x 9 or 8 x 10 negatives, 11 x 14 or 14 x 17 paper is frequently employed. So, if you are printing from a cabinet negative and the prints are to be 8 x 10, the glass and printing frame must be 8 x 10. Place a piece of this glass in the printing frame. Cut a sheet of opaque, or what is commonly called post office paper, the exact size of the glass. This paper is to be the first mask. With a straight edge or rule, draw lines from opposite corners; where these lines cross will be found the exact center. (See Fig. 1 of Illustration No. 13.) Next select a cut-out form of suitable size and shape to fit the negative and subject. It may be square, oblong, round, or like the oval which we have chosen for illustrating this instruction. If oval cut-outs are used, provide an adjustable trimming wheel.

1170. There are a number of trimming devices. Most of them give satisfactory results. The Ingento revolving trimmer, however, will enable you with one and the same trimmer, to cut five different size ovals from one form, by simply changing the wheel and flange to various positions; making it possible to make four sizes of masking, or four different widths of margins in the finished print. Place the cut-out form on the center of the masking paper, being guided by the pencil marks. Then with a double trimmer cut out the oval, preserving the inside of the cut-out. (See Fig. 3 of Illustration No. 13.) Without moving the cut-out form again, trim this sheet with a single trimmer, which cuts closer to the form, thus making Fig. 2 a trifle larger than the first piece cut out in Fig. 3.

1171. Next place the mask (Fig. 2) on the glass in the printing frame, placing the negative on this, masking carefully and adjusting it over the opening. Fasten the negative at the corners to the mask with strips of gummed paper (also shown in Fig 2). Place the senstive paper on the negative and print to the proper depth for finished print. When printed, remove from the printing frame and place the print face up on a piece of glass, a trifle larger than the print, which in turn has been placed on a piece of cardboard of the same size. On the center of another piece of clean glass attach, with a little paste, mask No. 3, placing this glass and mask over the print and properly adjusting the mask over the printed part.

1172. Mask No. 3 being a trifle smaller than the opening in mask No. 2, will cause the printing of a line around the print. In Figures 4 and 5 note two masks that are the same as No. 2, the only difference being that No. 4 has a trifle larger opening than No. 2, and No. 5 an opening a trifle larger than No. 4.

1173. The size of these openings is governed entirely by your own personal taste and judgment. For example, No. 4 may have an opening one-half inch larger than No. 2, thereby producing a one-half inch dark border around the print, while the No. 5 opening may be two inches larger

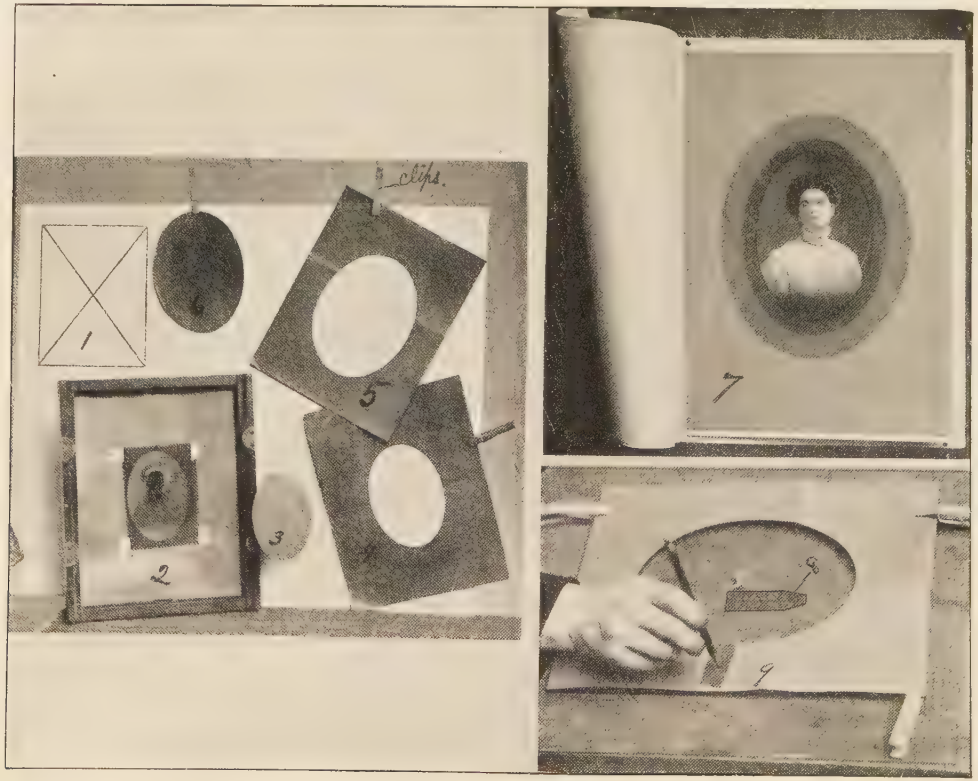


Illustration No. 13 Border Printing See Paragraph No. 1169

PORTRAIT
See Page 387

STUDY NO. 20 BY E. A. BRUSH

than No. 4, which would produce a 2½ inch dark border around the print. The time of printing will govern the different depths of these borders. Fig. 6 is a mask like Fig. 3, with the exception that it is larger, but having been trimmed with a single trimmer in same manner as Fig. 3, it is a trifle smaller than the opening from which it was cut (mask No. 5).

1174. After placing mask No. 3 (which is tacked to plain glass), mask side down, on the print, carefully adjust it so it will leave an even margin all around. In order to block out all of the border and prevent it from printing, and at the same time print another border, place mask No. 4 over No. 3. This will give an exposed margin of the unprinted paper around Fig. 3. Place a piece of clean glass over mask No. 4 and with photo clips (see illustration) hold the glasses, masks, print and cardboard together. Place in the printing light and print until the desired tint is obtained. Judge the depth of printing entirely by its appearance upon the surface. If a toning paper is used, you must print two shades deeper and allow for the toning which will make the tinted parts a trifle lighter.

1175. Having printed this section, next remove mask No. 4 but allow mask No. 3 to remain on the print and in place of mask No. 4, place mask No. 5, carefully adjusting it to obtain an even margin. Place a plain glass on this mask, again fasten with photo clips, place in the light and print to the desired shade. After this remove mask No. 3 and No. 5, placing mask No. 6 in position on the print, cover with plain glass and place in the window to tint. Mask No. 6, being a trifle smaller than the opening in mask No. 5 will produce a dark outline on the border made by mask No. 5 and the balance of the paper will also become slightly tinted. In Figure No. 7, we present the finished print mounted in a folder.

1176. Upon examining this picture you will find a very dark, almost black, narrow outline around the small oval. This was made by mask No. 3, which was a trifle smaller than the opening in No. 2; next is a border of one

inch, not quite so dark as the first outline. Next, there is a border about 2½ inches wide not quite as dark as the one inch border; then a fine outline, a trifle darker, though not quite as dark as the first outline around the 2½ inch border, and finally the balance of the print tinted to a light gray. With a little practice, care and patience, and a supply of different shapes and sizes of masks, a large variety of pleasing effects may be produced.

1177. **Making Oval Masks of Various Sizes Without a Trimmer.**—Begin with the making of the first cut-out from one of your regular forms; then, for the next tint, should an inch margin be wanted, make the trimming guide as follows:

1178. Take a piece of stiff post office paper ⅝ of an inch wide by about 2 inches long, slightly tapered at one end. (See Figure No. 8.) Bend this paper double at the dotted lines, or just a trifle inside of where the strip begins to taper. To make a mask with an opening one inch larger than any mask you may have, measure one inch from the bended edge and with a sharp pencil pierce a hole in the guide.

1179. **Using the Guide.**—Lay the paper oval cut-out on a sheet of glass. Hook the guide, tapering side down, underneath the cut-out. Place the point of a sharp pencil in the little hole and move the pencil, which will draw the guide around the opening and give an accurate oval line exactly one inch larger than the first cut-out. (See Fig. 9). Then, with sharp shears, follow the line carefully and the mask is made. A desired size can be made by simply piercing holes in the guide according to the size margin you may require. If a very wide margin is wanted, it is best to have the under flap a little longer, from a quarter to a half-inch of where the pencil will operate. If the lower flap is too large it will interfere with the movement of the pencil. Always use glass under the cut-out, in place of a card, as the guide will move around and follow the opening more freely.

CHAPTER XLIV.

Gravure Effects.

1180. **Introduction.**—Gravure effects are produced by closely vignetting, or blocking out, the entire figure in any negative, then printing on large sheets of paper, the figure vignetted in the center with a large white margin around it. After printing, developing and drying, the prints are worked with crayon, either by hand or with an air brush.

1181. The prints should be made on platinum paper of heavy weight. This paper has a surface that will readily take the crayon sauce, and, therefore, will permit the production of an almost endless variety of backgrounds, from the light fleecy clouds to strong, bold, sketchy, or charcoal effects.

1182. The production of these gravure effects is an operation of some little delicacy, but easy when set about in the right manner. To demonstrate its simplicity, an extremely difficult subject has been selected for illustration. The background is dark, whereas if we had selected a negative with a white background matters would have been much simplified. One will readily appreciate this when attempting to vignette a dark background, as some little difficulty will be experienced in vignetting sufficiently close to eliminate all of the black background. Therefore when making a sitting for the express purpose of producing a gravure effect, use a white background.

1183. **Placing the Negative in Proper Position on Plain Glass.**—Suppose a 5 x 7 cabinet bust negative has been selected from which to produce a gravure print. First,

supply a clean 8 x 10 glass and an 8 x 10 printing frame. Examine the glass by glancing along the edge in order that you may see which is the concave or convex side. Next examine the negative in like manner. Then place the negative film side up, on the glass, so that the glass and negative curve in the same way, thereby bringing them into perfect contact. This will prevent the danger of the negative or glass breaking when the back of the printing frame is placed in position and the springs pressed down and fastened.

1184. After having placed the negative in proper position, carefully spacing to produce proper margins—at sides and top about the same with a trifle more space at the bottom—fasten the negative to the glass by sticking with adhesive paper at the corners (See Illustration No. 14.) The next step is to paste over the back of the printing frame a piece of yellow postoffice paper the exact size of the frame. Holding the printing frame towards the light, with the negative towards you, with a soft pencil trace the outline the exact shape of the subject's head and shoulders, and also as much of the bust as it is desired to show. When looking through the negative to the light the shadow of the pencil lines on the postoffice paper is so clearly visible the outline can be easily traced. (See Illustration No. 15.) Next, remove the negative and with a pen knife or small scissors cut out around where you have marked, thus producing an opening in the yellow postoffice paper. This opening, as we have already said, must be the exact size and shape of the head and bust on the negative. In Illustration No. 16 you will notice white cotton placed around the opening cut in the yellow postoffice paper. This absorbent cotton is placed there to prevent light from spreading on the negative, which, if permitted, would cause too large a spreading of the vignette.

1185. A little practice will be required to adjust the cotton exactly right. In order to produce a soft blending effect, the cotton must not be matted close, but applied loosely, so as to filter light at the opening of the vignette,

Illustration No. 14
Fastening Negative to Glass
See Paragraph No. 1184

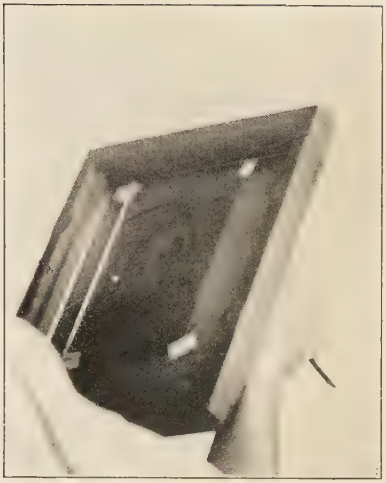


Illustration No. 15
Tracing Image on Paper
See Paragraph No. 1184

Illustration No. 16
Placing Cotton Around Image
See Paragraph No. 1184

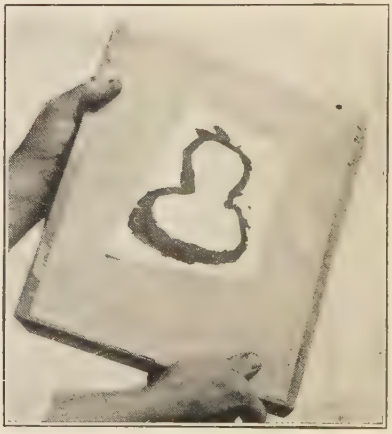


Illustration No. 17
Blending Vignette with Opaque
See Paragraph No. 1187

Illustration No. 18
Vignetted Print Before Gravuring
See Paragraph No. 1190

being gradually made thicker as it nears the outline of the figure.

1186. Compare the negative in the illustration with this vignette in the printing frame, and note that we have followed the outline of the figure in the negative very closely. This is necessary in order to vignette out the background perfectly.

1187. After you have placed the negative in the frame and clamped on the back, turn the frame over and paste a piece of very fine tissue paper or onion skin over the opening. This will aid in blending the vignette. Again remove the back, hold the frame toward the light, and with a small brush apply a thin coating of opaque to the tissue paper on the edge of the opening. This will still further help to blend the vignette. (See Illustration No. 17.)

1188. If these instructions have been carefully followed and the background blocked out by vignetting, all is ready to proceed with the making of the print. Before placing a full sized sheet of platinum paper on the negative, however, we would advise that a vignette test be made with printing-out proof paper. If you find the vignette spreads too much, or shows too far down on the body, make it vignette closer by placing the cotton closer to the opening; also by painting still closer to the outline on the tissue paper with opaque. When the vignette is correct, place the paper in position and print as usual.

1189. You must be careful, however, that the printing frame is placed at the correct angle, facing the sun squarely. If the frame lays too flat too much vignette over the head will be produced. If turned away from the sun, the vignette will spread on one side more than on the other. If the printing frame is placed close to a perpendicular position, the vignette will show too low on the bust. Place the printing frame at an angle as near to the angle of light with the sun as possible.

1190. The vignetted print when finished should appear like Illustration No. 18, the background vignetted off closely around the head and the ground absolutely white.

1191. The next step is to work in the background. The material required is as follows: A small piece of absorbent cotton, some pumice stone, a stick of crayon sauce (this crayon sauce is a black material wrapped in tinfoil), and a small artist's rubber. To work in the background proceed in the following manner:

1192. Take about one-third of the crayon sauce and crush it to a fine powder in a pasteboard box cover. Mix with the crayon sauce a little of the pumice stone, about one-fourth as much as the crayon sauce. This pumice stone will supply grit, which, when rubbed into the print, will cause it to take the crayon readily. Tack your print to a drawing-board, or any smooth board, then with the absorbent cotton which you should form into a stump, apply the mixture of crayon sauce and pumice stone. Begin first by rubbing close to the outline and gradually work lighter as you leave it. If the line vignetting off the bust is quite sharp, build up to it and blend off gradually. The crayon should not be applied evenly all around, but irregularly, producing sort of a cloud effect. Do not apply too heavily. After having blended in the background, take the artist's small rubber, or eraser, and cut in the catch lights. These are the light streaks of white in the background. Do not cut them in too sharply, as they should have soft blended edges, and be made with one stroke of the rubber.

1193. Illustration No. 19 shows this picture completely finished, mounted in a folder ready for delivery. Illustration No. 20, which represents a plain print from this negative, is shown for purposes of comparison. In Illustration No. 21 is presented a group of gravure portraits, each treated slightly different. Carefully study the illustrations. They will give some idea of the results to be tried for. After a little practice it will be found possible to produce an almost endless variety of effects.

1194. To those who are in the habit of using an air brush, or to a crayon artist, this method of putting in backgrounds will prove very simple. While the effects produced by the air brush are pretty and can be easily produced, you

Illustration No. 20
Plain Direct Print
See Paragraph No. 1193

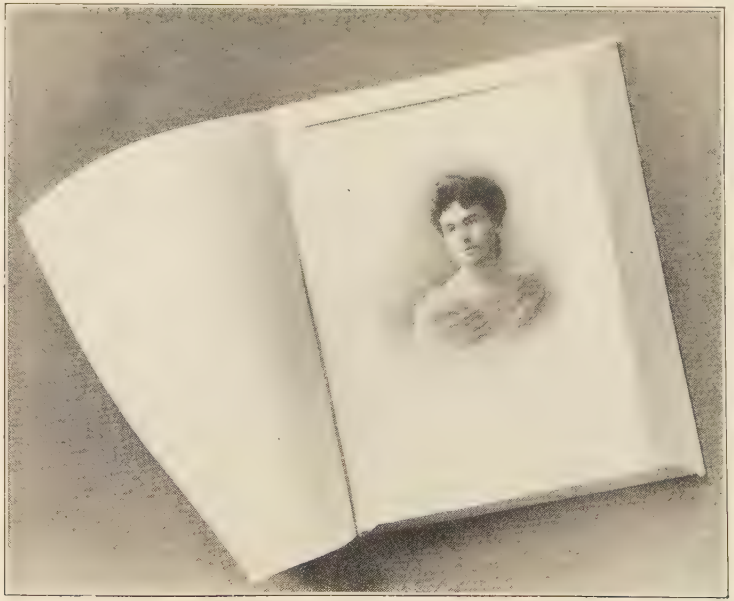


Illustration No. 19
Gravured Print Mounted in Folder
See Paragraph No. 1193

Illustration No. 21 Group of Gravure Portraits See Paragraph No. 1193

will find that backgrounds rubbed in with the cotton and worked up by hand are much more sketchy and effective.

1195. Gravure portraits should be placed in suitable folders, or if mounted, large light-weight mounting board should be used. They are very pretty when embossed, and where heavy platinum paper is used may be delivered unmounted, each print placed in a tissue enclosure.

CHAPTER XLV.

Trimming and Mounting.

1196. **Introduction.**—The finishing touches are generally responsible for the making or the spoiling of many things. This can be no more emphatically exemplified than in the completion of a photographic print. Careless trimming or unsuitable mounting may easily ruin the most perfect print—either portrait or landscape—yet it is seldom the amateur, or even the professional photographer, gives due consideration to this most important feature. Many take great care to produce the most technically correct negative, work with utmost pains to procure the resultant print, but are extremely careless and indifferent as to the trimming and mounting.

1197. Both trimming and the mounting form the most difficult feature of the finishing of a photographic production, due to the fact that if successful, these two operations must conform to the original idea that was intended to be expressed in the picture. The mounting must, to a large degree, continue or conclude the general treatment of the subject. As an example: A strong, vigorous print will be out of place, and many times ruined, by placing it on a mount of too light a shade. On the other hand, a print with delicate fleecy tones may be entirely killed if placed on a black mount. Yet these mistakes are made daily, and without the least reason for so doing.

1198. Imitation is no doubt the cause of the greatest amount of trouble. Some particular mounting has been seen and admired, but is was not recognized that this was the dress for a particular photograph, which although per-

fectly suitable to this print, would be entirely out of place if applied to another.

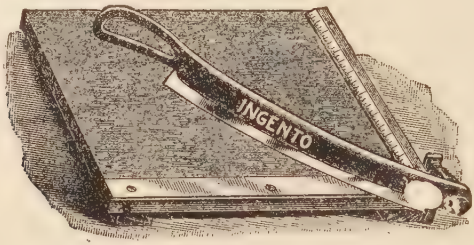


Illustration No. 22
Ingento Trimming Board
See Paragraph No. 1200

1199. A few years ago very little thought was given to the displaying of prints on suitable mounts. The mount was simply a rectangular card of white, or doubtful gray, with a certain amount of embossing which necessitated the placing of the print in the exact center of the

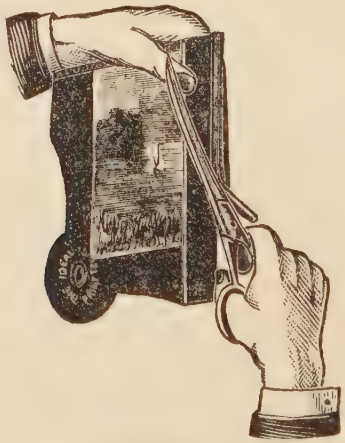


Illustration No. 23
Ideal Print Trimmer
See Paragraph No. 1200

card. One redeeming feature of this kind of a mount was that one could not possibly make a mistake by using it

wrong end upward. Even today mounts of a similar character are manufactured and sold by the thousands. Some are slightly altered, leaving more space at one end than at the other; to others has been added a tinted border, but there is absolutely no display of an artistic character, or individuality, in employing such mounts.

1200. **Trimming.**—As a rule, when the print comes from the frame, the edge has a jagged or rough border, caused by the rebate of the frame. This must be cut away and the edge of the print left straight. A regular trimming board should be used (See Illustration No. 22), or a scissors may be employed with the device shown in Illustration No. 23. The simplest method of trimming, however, is to secure a knife of good steel and keep the edge sharp by constant application to an oil stone. The print should be placed on a piece of plate glass or zinc, and in order to guide the knife straight and cut the corners at perfectly right angles, a wooden straight-edge or steel square should be employed. Having trimmed one side, square the straight-edge to it and cut the other side, and so on until all four sides are trimmed. This will give clean cut edges and the opposite sides will be parallel. Instead of the straight-edge, glass forms larger than the print, with perfectly square corners, may be employed, and by trimming one side and one end at a time, the corners will be absolutely square. These glass forms should have the edges made perfectly smooth by rubbing on a piece of sand paper.

1201. There is, however, a more important point to trimming than this. It is usually a perplexing question with the average worker, to know how much to trim. As a rule, the knife is used too sparingly, in order to save every scrap of paper and to preserve the complete image as shown in the negative. It is for this reason that too much is usually retained, to the detriment of a pleasing picture.

1202. It must be borne in mind that there should be but one principal object of interest in the composition. Everything that detracts from this object should be elim-

inated in the trimming. Especially in landscapes are there most frequently objectionable details included in the negative, which, if trimmed away, would leave an excellently composed picture. Many times there is too much foreground or too much sky; perhaps the line of the horizon cuts the picture space in two. Trimming then becomes necessary, to eliminate the objectionable features and to bring the horizon either above or below the center, as the subject may require.

1203. **The spacing of portraits** is also of great importance. Especially is this true when the subject is posed in profile. If the face were placed in the center of the picture space, the nose would almost touch one edge of the print. There must be enough room in front of the face to give the subject proper distance into which to gaze. Such prints may be improved by removing a portion of the print at the back of the head. It is safe to say that five out of every six prints could be greatly improved by judicious trimming. When a portion of a picture has nothing of interest in it, or if it is not required to balance the remaining part, trim it off.

1204. Before using the trimming knife experiment by laying two pieces of cardboard on the print, moving them backward and forward, up or down, until the best effect and proper balance are apparent. Two pieces of dark cardboard, cut in the shape of a letter L, longer and wider than the print, and about one inch in breadth, laid on the face of the print will form rectangles of different sizes and shapes, when it will be easy to judge how much of the print to leave and the most suitable shape for the print to be when finished. Illustration No. 24 will help to explain this.

1205. To the novice, trimming the print usually seems a waste of good material. In fact, it sometimes requires a mental effort to decide to cut a print to half its original size, or even less; nevertheless it is often greatly improved by this procedure.

1206. If you are still bound by fetters that hamper

Illustration No. 24
L Shaped Cards for Spacing of Print
See Paragraph No. 1204

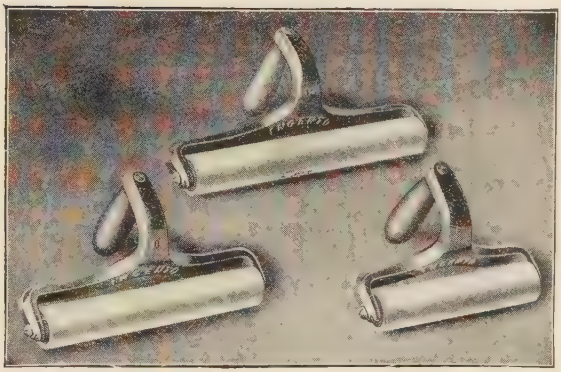


Illustration No. 29
Print Rollers
See Paragraph No. 1225

A CLOUD WITH A SILVER LINING (Statue of Liberty)
STUDY NO. 21 See Page 387 BY DR. A. R. BENEDICT

the judicious employment of the trimming knife, you have failed to grasp one of the most important elementary lessons of pictorial photography. You have yet to learn and realize that you must not use the trimming knife too sparingly, as it is one of the most valuable aids to the securing of proper arrangement of the actual subject with regard to the edges of the print.

1207. It is seldom possible to employ the stock cut-out mounts, or those with printed lines or figured patterns. Only once in a great while can the original negative be reproduced and the print kept in its full size. In portraiture there are certain standard sizes of pictures, and for these there are also standard sizes and shapes of mounts. For commercial work, the plainer and simpler of these may be used with satisfying results. As the standard cabinet prints will always be in demand we show in Illustration No. 33 a series of suitable solid mountings for these standard size prints. For commercial studio work one should have in mind, during each stage of negative making, even when posing the subject, a particular mount on which to place the print.

1208. Where artistic work is involved it is not possible to make hard and fast rules as to the size and shape, nor as to the amount of the print that should be removed by trimming. This must be decided when the print is before you. Your artistic talent will be brought into play and thoroughly tested at such times.

In landscapes there are certain rules relative to the proportion of the sky and foreground. Not in one case of a thousand should the horizon come exactly in the center of the picture. As to whether the horizon line should be above or below the center, all depends upon the subject. Sometimes the sky, or the foreground, requires at least two-thirds of the visible space; much depending upon which contains the greater amount of interest.

1209. A sunset view, or a print containing a beautiful cloud effect, has the interest centered in the sky. Therefore, two-thirds of the print should be left above the hori-

zon (the horizon is of course, understood to be where the sky and earth seem to meet). A seascape frequently contains a great deal of life and interest in the water or waves in the foreground; therefore, in such a case the foreground should be in greater evidence than the sky.

1210. The width of the print must be considered as well as the height. Many times cutting off an inch of the width will produce a wonderful improvement.

1211. **Trimming Ovals.**—While not all pictures are suitable for this form of trimming, frequently the oval form will enable you to cut off an objectionable corner. When the composition has many straight lines the oval trimming will greatly improve the print. Special points of interest may be accentuated by oval or circular trimming.

1212. **Trimming Appliances.**—The edges of prints must be clean and perfect, no matter whether trimmed

Illustration No. 25
Ingento Revolving Trimmer
See Paragraph No. 1213

in the oval form or square. Ragged edges of circles and ovals not perfectly shaped will make prints worthless. There are special manufactured appliances for the proper trimming of the oval, which will be found at any photographic supply house. Where 4 x 5 or smaller prints are to be trimmed square, the "Ideal" print trimmer is a most practical device. It is made of metal, finely plated, and equipped with a graduated measure. (See Illustration No.

23.) To trim the print place it in the trimmer, with the edge to be trimmed under the guide and the adjoining side in contact with the measure, at the top. Press the thumb on the guide which holds the print in place, and then with a pair of shears cut along the edge of the guide.

1213. Illustration No. 25 is an "Ingento" Revolving Trimmer. For trimming circles and ovals this trimmer will be found absolutely perfect. Every bearing of its mechanism is of tempered steel, and it is built on lines of highest efficiency and durability. The post revolves on a group of steel balls, cutting down the friction to a minimum, thereby allowing the post to glide smoothly and freely during the operation of trimming. The cutting wheel, also the pin on which it revolves, is made of the finest tool steel and highly tempered, making it impossible for them to wear. The wheel is made with a bearing of ⅛ inch, instead of only the thickness of the wheel as in all other trimmers. This large bearing prevents the wheel from wabbling and binding on the pin, at the same time decreasing the chances of wear. Five different sizes from one form can be cut with this trimmer by changing the wheel and flange in different positions, making it possible to make four sizes of masks; hence four different widths of white margin on the finished prints. All metal work is handsomely nickel-plated and polished, and the handle, to be in keeping with the high-grade finish of all other parts, is mahogany finished and hand polished. Extra wheels can be purchased for this trimmer.

1214. Illustration No. 26 shows the "Ideal" Cut-Out Forms. These Ideal Forms are ground off smooth inside, which allows the cutting wheel to slide along smoothly. These sizes and shapes are perfectly adapted for the standard sizes of mounts. They are made of brass in the hard material and are handsomely polished and lacquered.

1215. Illustration No. 27 is the "Ingento" Form Holder. This holder is an indispensable accessory to the perfect cutting of oval prints. It is made entirely of metal,

which gives it lasting qualities and also guarantees it against warping. There are no useless levers or springs in the way during the operation of cutting. The form being held securely in the clamping lever retains its same position, which facilitates the quick and accurate cutting

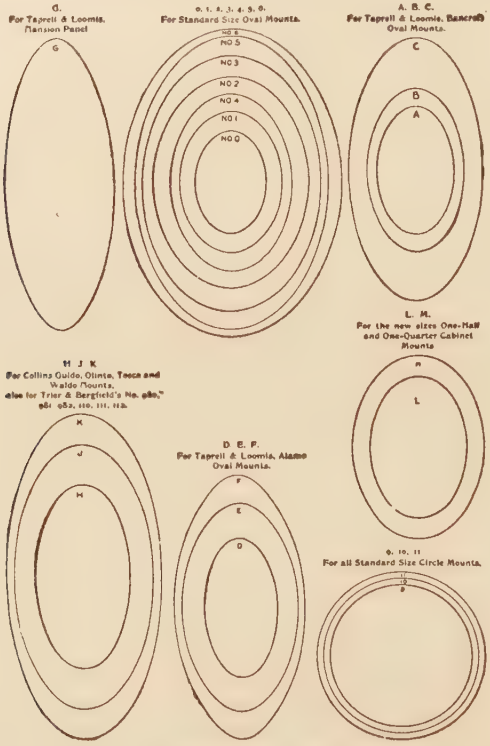


Illustration No. 26
Ideal Cut-Out Forms
See Paragraph No. 1214

of the prints. When this form holder is used, prints are cut in the shortest possible space of time. The cutting plate is made of zinc and is reversible, so that either side can be used. The complete device is handsomely nickel-plated and is mechanically perfect. Made in two sizes; 5½ x 8¼ and 8 x 10.

1216. Illustration No. 28 is called the "Ingento Centering Square." There are few photographers who have not experienced more or less trouble in centering photographic prints on plain mounts or in mat openings. With this novel square the operation is so simplified that the print or open-

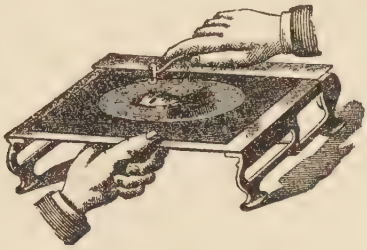


Illustration No. 27
Ingento Form Holder
See Paragraph No. 1215

ing can be instantly and accurately centered with equal margins all around. The square is made of heavy sheet brass, accurately graduated from one to five inches, and handsomely nickel-plated. Full directions for using accompany each square.

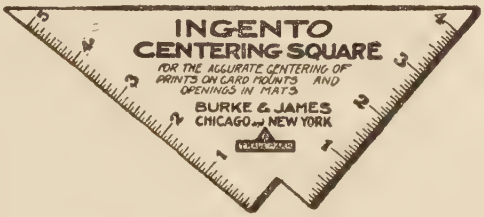


Illustration No. 28
Ingento Centering Square
See Paragraph No. 1216

1217. Another very useful implement is a celluloid square. This can be purchased at any artist supply store. It should be of good size. When selecting a square be sure to get one which is really at perfect right angles on its working sides. The advantage of using a transparent square is that it does not conceal any part of the print that

you are trimming. It will enable you to do the work with ease; to see what remains as well as what is cut from the print. Another advantage is that you are enabled, by proper placing of the square on the print, to make two cuts before lifting it, with the assurance that they are at perfect right angle to each other.

1218. When trimming prints, printed under a mask and having white edges, the celluloid square is particularly useful. We would caution you, however, to be very careful when using the knife with the square. The substance from which the square is made is much softer than the blade of the knife, so always turn the knife edge slightly away from the square, to avoid cutting it. With a little experimenting and practice you will be able to trim prints without injuring the square.

1219. **Trimming Wet Prints.**—If you desire to mount prints solid, without previously drying, they may be easily trimmed, while wet, in the following manner:

1220. Take a square sheet of glass, wet it and place the prints face down upon it. Turn the glass over so the prints will be on the under side, face up. Move prints to the edge and to one corner of the glass and square these two corners by cutting with a pair of shears. With these two corners squared, slide the print to the opposite corner of the glass and square the remaining two edges in a like manner. As fast as the prints are trimmed, place them back in the tray of water until all are trimmed.

1221. **Commercial Mounting.**—Studio work as a rule, requires mounts of different sizes, of variety of styles, and sizes and shapes of openings. All the different mounts employed should be collected and laid on the mounting table ready for use.

1222. **Pasting.**—To come down to the dry details of pasting the print, there is fresh starch paste, or the Higgin's Prepared Photo Paste, an excellent and ready-for-use preparation for ordinary mounting of prints. For commercial purposes, however, and where a great deal of mounting is done, as in a studio, fresh starch paste is the best and

"JANET"

STUDY NO. 22

BY ELIZABETH FLINT WADE

Illustration No. 30

Illustration No. 31
Mounting Prints
See Paragraph No. 1225

most economical. The good mountant must stick well and promptly and not affect the print, either chemically, mechanically, or by discoloration.

1223. **Starch Paste.**—The following formula will make a good starch paste:

To one-half pint of water add one tablespoonful of common gloss starch. Dissolve the starch in the water and place on the stove to cook, stirring constantly until it begins to thicken to a thin jelly. Then remove from the stove, but continue stirring for a minute or so until all the lumps are dissolved. Set aside to cool. When cold, strain through cheesecloth. Gather the ends of the cheesecloth in one hand, slipping the other hand over the paste and thus squeeze the paste through the cheesecloth, when it will be ready for use.

1224. The above amount of paste will be sufficient to mount from 75 to 100 cabinet prints, or their equivalent.

1225. **Mounting the Prints.**—Lay out the prints on a large glass plate, or smooth board covered with oil cloth. Arrange them face side down. Place them in rows, first one row at the upper edge of the mounting board, then a second row slightly overlapping the former, with the third overlapping the second, and so on until the entire board is covered. Mop off the excessive water by placing a blotter on the prints, rolling over with the print roller (See Illustration No. 29) until all surface water is removed, then apply with a bristle paste brush to the back of the prints any ordinary starch or prepared paste. Pick the print up at one corner, bringing the paste side in contact with the mount. (See Illustration No. 30.) Next place a clean blotting paper over the print, on the mount, and rub down with a print roller until the print is in perfect contact with the mount. The print should then be placed in the rack to dry. Always be careful to wipe off superfluous paste which may be on the face of the print. Do this with a soft sponge. (See Illustration No. 31.)

1226. When dry, shape the mounted print by running it through a cold burnisher. Any imperfections in the

finished print may be corrected by spotting, using a fine sable brush and spotting color or India ink. Care should be exercised to select mounts which harmonize with the tone of the print. If sepia prints are to be mounted, any shade of brown, or some of the deeper reds, may be used. These mounts would not suitable for black and white tones however. For black and white prints shades of gray, carbon black, buff or cream color may be successfully used.

1227. Double weight papers may be mounted solid, but are better mounted in folders. A most artistic method of making prints with double weight paper is to use a sheet considerably larger than the negative to be printed from. This necessitates the use of a larger frame. For a 4 x 5 or 5 x 7 negative a 6½ x 8½, or 8 x 10 printing frame should be used. Use a piece of clear glass the full size of the frame, fastening the negative to the center of the glass with strips of gum paper. Cut a mask of opaque paper the full size of the glass, and from the center cut an opening at least one-quarter of an inch smaller than the size of the negative. Place the mask in the printing frame between the paper and the negative, printing and developing the exposed paper in the usual manner. This will produce a print having wide, white margins. When thoroughly dried and straightened, by using an embossing board, an imprint or counter-sunk margin about half inch from the edges of the print will give the effect of an etching, or engraving. Enclosed in a folder mount, made of cover paper of desirable tone, the result will be as artistic as can be produced.

1228. **Enameling Glossy or Special Glossy Prints.**—This grade of paper can be burnished with an ordinary burnisher, but care must be exercised that the burnisher is not too hot. Another method is to place the wet print, face down, on a ferrotype tin and then, with the print roller, bring the print in absolute contact with the tin and allow it to become bone dry. It can then be readily peeled off by raising one corner with a pen knife. The surface of the

print will have assumed a very high lustre. If your ferrotype tin has been used for some time portions of the print may stick. To prevent this it is advisable to prepare the tins as follows: Dissolve one ounce of paraffine in 10 ounces of benzine. Allow this solution to stand for a few hours. This will give the undissolved parts time to settle. Wash each ferrotype plate with clean water. Next swab the plate with this paraffine and benzine solution. After the solution has been applied be careful to rub the entire plate dry with clean cloth or absorbent cotton. If too much of this solution is kept on the ferrotype plate, the prints will have a greasy appearance on the surface. If the print is not brought in contact with the ferrotype plate there will be spots on the print which will lack the high lustre. If you find the prints will not peel from the plate, the plate has not been properly prepared. It will then be necessary to place both print and plate in water to soak, until the print will peel off. Then, carefully wash your plate and apply the solution again.

1229. **Tacking the Print Instead of Pasting Upon the Mount.**—All platinum prints, or those which lay flat without mounting solid, should only be tacked at the upper edge—of course such prints must be dried and trimmed before tacking—and as light-weight mounts are usually used for this purpose, special paste which will not cockle should be employed. The following formula is easily made and will keep for months:

1230. To make 3 ozs. of this paste, take 1 oz. dextrine to 2¼ ozs. of water. Mix until all is dissolved, then place on the stove to boil, stirring constantly until it thickens, after which remove and allow it to cool. Before cooling, however, add a few drops of oil of wintergreen. Wintergreen preserves the paste and keeps it from spoiling.

1231. **Mounting the Print.**—Only the upper edge of the print should be pasted and for this purpose a small one-quarter inch Faber brush should be employed. The print is adjusted to the mount and immediately weighted down with a piece of glass. The print and mount will then

dry spontaneously. Where much mounting is done, several pieces of glass should be used, although as many as a dozen prints may be stacked one on top of the other, the weight holding them firm and free from cockling. After ten or twelve prints are mounted, however, another glass should be used to insure perfect contact and to obviate cockling.

1232. **Artistic Mounting.**—The mount must be one that will not detract from the print. On the contrary it should be subordinate to it. From this it will be understood that the use of fancy mounts should be avoided. As it is seldom that the numerous styles of stock mounts on the market will fit the trimmed print, it is usually advisable to make one's own mounts, or purchase those without set openings, so that any print within reasonable limits can be used upon them. Each print will require special consideration both as to final color and shape of the mount.

1233. There are three vital reasons for mounting a picture: First, to aid the enlargement of the print without damage; second, to isolate the print from its surroundings, and third, to enhance the artistic value of the print. The right mount will answer all three of these requirements. A mount must not be used for its own value, but for the artistic aid it lends the picture. For this reason a plain mount, void of fancy designs or colors, should be employed.

1234. **Shape of Mount.**—The shape of the mount depends entirely upon the shape of the print. An oblong print should have an oblong mount; an upright panel shape print should be placed on an upright panel shape mount; a square print on a square mount, etc. Ovals, circles and ellipses should be sparingly employed, as there are few subjects that a rectangular shaped mount does not suit better. The amount of space at the top and sides of the picture may be equal, with wider space left at the bottom. If a print is mounted in the dead center of the mount, it will appear as if mounted just below the center. If a title or signature is placed under this the optical illusion is still greater, and gives the picture the appearance of falling from the mount.

1235. **Size of Mount.**—The size of the mount also depends, to a great extent, upon the size of the print. A 4¼ x 6½ print may be very suitably placed upon an 8 x 10 mount, with other sizes in proportion. Of course a hard and fast rule cannot be laid down, as it depends wholly upon the results aimed for. Generally, prints of large subjects, such as full size heads, will permit the employment of much larger mounts, in proportion, than will prints in which the objects are small. Avoid extremes. If too large a mount is used the print will be lost, while a cramped appearance will be given if the mount is too small. The final decision must be governed by your individual taste, together with occasional study of the work of artist photographers. The studies in this, and other volumes of this library, present many excellent examples of artistic mounting.

1236. **Color of Mounts.**—To a certain extent the color of the mount to employ must be left to your own judgment. Before commencing work on a mount, lay the print on one color, then on another, until it appears to best advantage. A light print will appear still lighter if placed on a dark mount and a dark print will look darker if laid on a light mount. The eye is deceived, but you can turn this deception to practical account. If you think a certain print would be improved if it were lighter, mount it on a dark mount. If a print tends towards lightness, place it on a light mount and it will gain strength. Harmony is the keynote of mounting. Violent contrasts must be avoided. A warm print should not be placed on a cold toned mount. For example: A sepia print would look entirely out of place on a gray or bluish mount, and conversely a cold tone should be placed on a cold tone mount; that is, a black print on a black, or gray, mount. White, being a neutral tint, may be used frequently for either a warm or cold toned picture.

1237. **Multiple Mounting.**—One of the most effective styles of mounting for platinum prints is known as multiple mounting, which calls for the use of two or more tints of

paper, or light cardboard. The first piece is just a little larger than the print, each successive piece being cut larger than the preceding one. Illustration No. 32 affords a perfect idea of this multiple mounting. Suitable paper, in a variety of shades, may be purchased from almost any photographic supply house. It is advisable to obtain a dozen sheets of various shades for preliminary experiments. The most satisfactory results, except under special conditions, are obtained with a small variety of tints, say from two to five.

1238. For example, we will suppose you are mounting a black and white print, and have selected a medium gray paper as the ground work of your mount. Your intention is to surround the print with a border of white and dark gray paper, with perhaps a line, or space, of paper the same color as the ground work. Before cutting your papers to the correct size, it is necessary to decide just what arrangement will best suit the print. Therefore, first lay a sheet of ground color (the gray) on your work bench. (See Illustration No. 32.) Upon this place a sheet of, say a darker gray. This is marked E. It leaves a good margin of ground color showing at the top and one side. Next place upon this another sheet of paper D, the same as the surface and the ground, showing at the top and right edge a narrow line of dark gray. Then place upon this another sheet C of dark gray, the same as E, showing ¾ inch of ground color at the top and left side. Now lay a sheet of white B, showing a narrow margin of dark gray, and finally place the trimmed print on the white, exposing a margin of ⅛ inch at the top and left. If your print has a white background, as shown in the illustration, it will not do to have a white mounting next to the print. In such a case the print should be surrounded by a dark narrow line, illustrated by A.

1239. When the color scheme is arranged on the work bench as outlined, lay a sheet of glass over all. This will keep the mount flat for inspection, and will give you the exact appearance of the mount, as it would be seen through

Illustration No. 32
Multiple Mounting
See Paragraph No. 1237

Illustration No. 33 Stock Cards for Solid Mounting See Paragraph No. 1242

a glass when framed. The top and left side of mount are arranged as they will look when finished, the bottom and right edges being, of course, untrimmed. Cover up the untrimmed and unarranged side by laying a piece of paper diagonally across from X to X, and the exact effect of the mount may be seen. If it is satisfactory, carefully number the widths of the various exposed margins, so that when the time comes for putting the mount together your arrangement may be readily recalled. If you are not pleased with the arrangement, readjust the various mounted papers until adjusted to your liking. If necessary, add to or take away from the original arrangement. Possible combinations are infinite in their variety, from the simple edging of white paper, to the multiple mount built up of half a dozen shades and widths of margin.

1240. **Mounting.**—In multiple mounting the print and mounts should be tacked only at the top—not pasted solid. Trim the first section to suit the print and tack the print to this section, pasting the upper edge only. Place it under a weight while trimming the remaining sections. After all are prepared the print and first section are tacked to the remaining sections in proper order.

1241. When all the layers are mounted, the whole is placed in correct position upon the table to remain under pressure until dry.

1242. **Stock Mounts.**—The various manufacturers of card mounts supply a large variety of stock mounts for solid mounting, as well as folders to which prints are merely tacked at the upper edge. The solid mounts are usually employed for printing-out papers and ordinary weight gaslight papers. The folders, soft or flexible mounts, are used more for platinum prints. Illustration No. 33 shows a variety of mounts of good proportion and color for solid mounting, while illustration No. 34 gives an idea of artistic folders. The mounted studies reproduced in this library furnish excellent examples for mounting and spacing.

1243. **Dry Mounting.**—A most convenient and prac-

tical method of mounting is the so-called "dry mounting." The Eastman Kodak Company have placed on the market a Dry Mounting Tissue, which they claim has solved the mounting problem. They also make an apparatus to be used in connection with the tissue. (See Illustration No. 35.) However, prints may be mounted without the special apparatus, as they advise "Just press with a hot iron—that's all." (See Illustration No. 36.)

1244. If a print is mounted wet it must, of course, be expected that more or less curl will result unless the mount is of sufficient thickness and weight to resist the pull of the print. Mounting on a thin mount with paste means curling. It would, therefore, seem that the most successful method, under all conditions, would be dry mounting with heat to secure contact. Dry Mounting Tissue does away with every objectionable feature of all other methods, permitting the mounting of prints of any size on the thinnest mount without curl. The pressure of a hot iron begins and completes the operation. The tissue is put up in all standard sizes, from 3½ x 3½ to 8 x 10, and is also sold in 5 yd. lengths, 20 inches in width.

1245. The method of mounting is to lay the print on its face and attach to its back a piece of mounting tissue the same size, or a little larger, than the print. Do this by applying the point of a hot iron to small spots at opposite ends. Turn the print face up, trimming it and the tissue to the desired size. Lay in correct position on the mount. Cover with a piece of smooth paper and press the whole surface with a hot flat-iron. Press down; do not rub. The iron should be just hot enough to sizz when touched with the wet finger. If the iron is too hot the tissue will stick to the mount and not to the print. If the iron is too cold the tissue will stick to the print and not to the mount.

1246. **Remedy.**—Lower or raise the temperature of the iron and apply it again. Full directions for use accompany both the mounting apparatus and the tissue.

1247. If you desire to go to the trouble of making

Illustration No. 34 Artistic Folders See Paragraph No. 1242

Illustration No. 33 Stock Cards for Solid Mounting See Paragraph No. 1242

a glass when framed. The top and left side of mount are arranged as they will look when finished, the bottom and right edges being, of course, untrimmed. Cover up the untrimmed and unarranged side by laying a piece of paper diagonally across from X to X, and the exact effect of the mount may be seen. If it is satisfactory, carefully number the widths of the various exposed margins, so that when the time comes for putting the mount together your arrangement may be readily recalled. If you are not pleased with the arrangement, readjust the various mounted papers until adjusted to your liking. If necessary, add to or take away from the original arrangement. Possible combinations are infinite in their variety, from the simple edging of white paper, to the multiple mount built up of half a dozen shades and widths of margin.

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1241. When all the layers are mounted, the whole is placed in correct position upon the table to remain under pressure until dry.

1242. **Stock Mounts.**—The various manufacturers of card mounts supply a large variety of stock mounts for solid mounting, as well as folders to which prints are merely tacked at the upper edge. The solid mounts are usually employed for printing-out papers and ordinary weight gaslight papers. The folders, soft or flexible mounts, are used more for platinum prints. Illustration No. 33 shows a variety of mounts of good proportion and color for solid mounting, while illustration No. 34 gives an idea of artistic folders. The mounted studies reproduced in this library furnish excellent examples for mounting and spacing.

1243. **Dry Mounting.**—A most convenient and prac-

Illustration No. 35
Dry Mounting Press
See Paragraph No. 1243

Illustration No. 36
Dry Mounting with Hot Iron
See Paragraph No. 1243

your own dry mounting tissue, the following formula should be prepared:

Gum Sandarac	10 parts
Copal	3 parts
Orange Shellac	4 parts
Resin	3 parts
Venice Turpentine	2 parts
Alcohol	11 parts
Spirits of Turpentine	11 parts

1248. A thin sheet of tissue paper should be thoroughly saturated with this solution, and having previously waxed a sheet of glass, lay the tissue paper on and again freely apply the above mixture. Allow it to dry and then strip from the glass. The paper thus treated may then be cut to the size of the print, laid between the print and mount and ironed with a hot iron.

1249. **Pointers.**—Never allow the surface of bromide, or gelatin printing-out paper prints to come in contact with anything while drying, as the gelatin is apt to stick.

1250. If it is necessary to dry prints quickly, soak them in two or three changes of wood alcohol. They will then dry rapidly in a warm place.

1251. To ascertain whether a large print is squarely trimmed, bend one edge over so that the two corners meet with the two opposite corners. If the trimming is true they should coincide.

1252. A strong solution of shellac in methylated, or rectified, spirit thinly applied to both mount and print, the two surfaces being rubbed into contact, will mount prints on the thinnest support without cockling.

1253. In multiple mounting never use more than two or three tints, and always try for harmony of color, avoiding great contrasts. Remember, the print is the feature to display, not the mount. Therefore, while it is a good plan to employ liberal margin, do not overdo it to the extent of having much mount and little picture.

CHAPTER XLVI.

How the Studies Illustrating This Volume Were Made.

Study No. 2. Portrait by John Garo, Boston, Mass. This picture was made in an operating room 35 x 45 feet; style of light, top and side; size of light 20 x 22. The light was used wide open without diffusing curtains. Lens used, No. 10 Goerz, Series III; focal length, 22 inches; stop used, open diaphragm; exposure given, 2 seconds; plate used, Seeds 27, developed in pyro; printing process, Willis & Clements platinum paper. (See page No. 15.)

Study No. 6. "Woods in Springtime," by W. H. Porterfield, Buffalo, N. Y. The exposure for this picture was made at 3 P. M. on a clear day. The lens used was a Gundlach; focal length, 6½ inches; stop used, F-8; exposure given, ½ second with screen; plate used, Cramer Isochromatic, developed in metol-hydroquinone. Diffused focus was obtained by using the lens full open and having the foreground only reasonably sharp; printing process, gray carbon: finished print was made on Whatman's double weight, extra rough water-color paper, home prepared. The print was brush developed, mounted with black portrait on light chocolate mount. (See Page No. 38.)

Study No. 7. "Autumn," by Wm. Spanton, Akron, O. The picture was made on a hazy day, 2:30 P. M., in the month of November. The lens used was a Bausch & Lomb Rectilinear; stop, No. 16; exposure given, 1½ seconds; plate used, Standard, developed with metol-hydroquinone. The print was made on platinum paper. (See Page No. 48.)

Study No. 9. "Off Tompkinsville, New York Harbor," by Dr. A. R. Benedict, Montclair, N. J. This picture was made on a cloudy, misty day. A film camera, fitted with Rapid Rectilinear lens. 6½ inch focus, was employed; stop, No. 4; exposure given, 1-25 of a second; negative made on Eastman film, developed in metol-hydroquinone. The enlargement was made on standard bromide mounted on black card. (See Page No. 68.)

Study No. 10. By Wm. H. Phillips, Liverpool, Ohio. Title, "Yokohama Harbor, Japan." This picture was made with a Folding Pocket Kodak, fitted with a Series III Goerz lens, 5 inch focus. The negative was made on non-curling film and developed with pyro. The print was a Royal Bromide enlargement, 6 x 10 inches, and developed with rodinal, strong solution—one part rodinal and six parts water. (See Page No. 91.)

Study No. 12. By R. E. Weeks, Chicago, Ill. "The Approaching Storm." The picture was made on a bright day with strong clouds; exposure was made at 12 M.; lens used Plastigmat; focal length, 7½ inches; stop, wide open; exposure given, 1-25 of a second; plate used, 5 x 7 Cramer Medium Isochromatic; developed in metol-hydroquinone; printing process, bromide enlargement, printed through bolting cloth. The clouds were printed-in from a cloud negative, and the print was mounted on brown mount with black margin. (See Page No. 125.)

Study No. 13. By Wm. H. Phillips, Liverpool, Ohio, Subject, "In Harbor." This picture was made with a No. 3 Folding Pocket Kodak fitted with Series III Goerz lens, 5 inch focus. The negative was made on non-curling film developed with pyro; the print was made on Royal Bromide, enlargement 6 x 10 inches, developed with rodinal strong solution, one part rodinal and six parts water. (See Page No. 139.)

Study No. 15. By R. E. Weeks, Chicago, Ill. Title, "Homeward Bound." This picture was hung at the Royal London and First American Salons. The exposure was

made at 9 A. M. on a bright, cold day, 10 degrees below zero. The camera used was an Eastman 3¼ x 4¼ kodak; stop, wide open; exposure given, instantaneous; negative was made on Eastman film, developed in hydroquinone-metol. Diffused focus was obtained by printing through bolting cloth. Printing process employed: bromide enlarging, 8 x-10, print being on Eastman's Platinoid Bromide, from a 3¼ x 4¼ film; picture mounted on a carbon black mount with black margin. (See Page No. 158.)

Study No. 16. By John Chislett, Indianapolis, Ind. Title, "On the Frozen River." This picture was made on a very cold day at 3 P. M., sun shining faintly; lens used, Goerz, full opening, and an Ideal color screen; exposure given, 1 second; plate used, Cramer Instantaneous Isochromatic, developed in ortol; print was made on platinum paper and the negative was manipulated on the back to lighten up the water and trees. The highlights are in the negative and are untouched in any way; print is mounted on a simple gray mount with black pencil lines. (See Page No. 239.)

Study No. 17. By E. A. Brush, Minneapolis, Minn. This picture was made in an operating room 21 x 44 ft., with a single slant light 15 x 18 ft., light used wide open with a light controlling screen; lens used, 3 A Dallmeyer; plate used, regular single coated, developed in pyro and printed on Angelo platinum paper. The portrait effects are all obtained in the printing. (See Page No. 240.)

Study No. 20. Portrait by E. A. Brush, Minneapolis, Minn. This picture was made in an operating room 21 x 44 ft. and a single slant light 15 x 18 ft. The light was used wide open with a light controlling screen; lens used, 3 A Dallmeyer; plate used, regular ordinary plate, developed in pyro and printed on Angelo platinum paper. The portrait effects were all obtained in the printing. The final print was mounted on very deep brown, showing only ¼ inch of the mount. (See Page No. 344.)

Study No. 21. By Dr. A. R. Benedict, Montclair, N. J. Title, "A Cloud with a Silver Lining." The exposure

was made at 4:30 P. M. on a very clear day, with at times a dark cloud. The lens used was a Rapid Rectilinear; focal length, 6½ inches; stop U. S. 8; exposure given, 1-25 second. The negative was made on Eastman film developed with metol-hydroquinone, no after manipulation. Printing process was an enlargement on Standard bromide. "As a help to others, I want to say that this picture was not faked in any way, but was taken just as you see it. I waited until the sun had passed under the fleecy edge of the cloud, as then the densest light would be subdued and would give a more pleasing moonlight effect. This picture was mounted on white cardboard, backed by oil tissue on a chocolate mount." (See Page No. 362.)

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